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THE
MINERS DICTIONARY.

EXPLAINING

Not only the TERMS used by MINERS,

But also Containing

The THEORY and PRACTICE

Sho! Of that most Useful *Mostyn*

A R T of M I N E I N G,

More especially of

L E A D - M I N E S.

- I. How a Gentleman may know whether HE has MINES in his Land, or not.
- II. How he may know the cheapest and best Way to come at THEM.
- III. The METHOD of carrying THEM on, in order to make them Profitable Works.

Together with a large Account of all necessary Materials that are required, conducive thereto.

THE WHOLE being of very great Use to all MINERS and GENTLEMEN, who have MINES in their own Lands, and to all such as are concern'd in MINES.

Being OBSERVATIONS made by the AUTHOR, from more than FORTY YEARS Practice and Experience, at the MINES in the High and Low PEAK in Derbyshire, Shropshire, South and North-Wales, and the North of England.

By WILLIAM HOOSON,
A DERBYSHIRE Miner.

Printed for the AUTHOR, and T. PAYNE,
Bookfeller in Wrexham.

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18

For Banks



T H E

DEDICATION

To all GENTLEMEN
Undertakers in MINES.

TH E following Sheets I recommend to your Patronage, and if you please to cast a Favourable Eye on them, I shall not care what the Ignorant may Think of 'em: It is to you the Kingdom in General are so much Indebted, for the Staple Commodity of Lead, Tin, and other Metals and Minerals; and the poor Miners in particular for their comfortable Subsistence.

I shall not enlarge, shall only add, that my Prayers, and the Prayers of all Honest Miners, will attend the Honest Fair Adventurers, and the Encouragers of all Honest Miners, that such may meet with Success in all their Undertakings. I am Gentlemen to the utmost of my Abilities,

Your most

Humble Servant,

WILLIAM HOOSON.



T H E
P R E F A C E.

Gentle Readers,

I Have much Lamented that no useful Book of Mineing has been Printed in the English Tongue, at least I never met with any that was Satisfactory: I therefore Compiled this following Treatise, in hopes thereby to provoke some abler Hand to Undertake so useful a Work; as this is the first of this Kind, I beg your Favourable Acceptance of my utmost Endeavours of being Serviceable to the Mineral World, and that you will Excuse all such Mistakes or Omissions that may have happen'd; I assure you it cost me a great deal of Thought and Time, but if it will be of any Service to you, I shall not think my Pains lost.

I am,

Your Humble

Servant,

WILLIAM HOOSON.



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T. H. E.

MINERS DICTIONARY.

AMERCEMENT.

A Punishment amongst Miners, where there is Customary Liberties, enjoining the Offender to Pay a certain Sum of Money, proportioned to the Offence; it is ordered by, and at the discretion of the Jury, or Twenty four, who are the Body of the Mine, and Judges in all such Cases, and may lawfully command and order it. (See Custome.)

ARREST.

When any Difference happens amongst Miners, concerning their Shares, or parts of the Mine or Groove, or Ore, Trespas-Wages, &c. the party grieved, gives to the Barmafter Four-pence and tells him his Grievance, who is obliged by his Oath, and his Office, to go to the Mine, belonging to him against whom the Complaint is made, and laying his Hand on the Stoce or Ore, or this Mear of Ground, and Uses these or the like Words, viz. *I do here at the Suit of A. Plaintiff, Arrest one Sixth Part of this Groove, for Wages, being now in Possession of B. or any claiming under him, who is to Answer this Suit, and put in his Pawn within three Days time after this Arrest, or loose his Cause by Default.*

A

Note

A

Note, The Barmafter is oblig'd to make his Arrest before good and sufficient Witneffes ; fo that if a Man be abus'd any way, he needs not go to common Law, but may have remedy by the Law of the Mines, which has provided very well in all fuch Cafes.

ARTICLES.

A large Scrowl of Parchment in which the Customs of the Mines are written, they are view'd and read (or at leaft ought to be, by the Steward of the Court,) by the Twenty-four, (and fome others are admitted of the young Miners) at every Barmote-Court, who then take their Oaths to be Governed by, and maintain the fame ; it is in their Power to add new ones to the old, if it feem needful ; and in this Court Amerce any Person that fhall by offending againft any one of thefe Articles, break the fame, but the Evidence on Oath, muft prove it againft him.

A. ss. or S. Hook.

A fmall Piece of Iron, wrought and turned like the Letter S. much ufed about Chain Pumps, when a Link or Ring happens to break, with this they may be fuddenly joyned or pieced together again ; for Bagg Pumps are often ufed in the Mines, where they are troubled with large Springs of Water, and are the beft yet difcoverd for that purpofe.

BANGERTS.

Thefe are a courfe fort of ftopping, ufed in the Panes to hold up the Earth. from falling down, between

between the Square Timber, &c. in Sinking, &c. made out of the Coursest of the Timber, and much inferiour to Polings, and yet stronger than Stoprods.

B A R.

A Grip or Twitch in a Vein or Pipe, striking it Dead, or at least very bad, and more hard than usual. (See Twitch.)

B A R M A S T E R.

A considerable Officer belonging to the Mines, and to whom is committed Matters of which we have already mentioned part; but now will tell his whole Business, in short whereby may be easily seen the necessity of his being a good and Experienced Miner, as also a Man of Integrity and Honesty.

He is kept at the charge of the Lord of the Mine, having under him one or more Deputies, as need does require, all acting upon Oath. He is Servant to both Lord and Miner; to the Lord in gathering his Duty or dues, (as we call it) that he be not wronged by the Miner, looks after freeing new Veins or old ones; also after Lordsmears, Primgaps, keeping the Dishtrough, attending the Miner at one Days Warning, to Measure his Ore at his Mine; also nicking and throwing off Possessions, laying out Mineral ways, seeing equal and just Measure of Ore, between Miner and Merchant, for the Merchant may shew a Fault in the Measure, but by the Custom, he is not to put his Hand to the Dish to amend the Measure, but the Barmafter is Judge; he attends on Cavers to Measure their Ore, and

obliged frequently to walk about in his Liberty to see the State thereof. If any Miner be killed by any Mischance in the Mine, he sits as Coroner on the dead Body; he also looks after Concealments, and Summons in the four and twenty, the major Part of them, or any two of them to meet and go down into any Man's Groove, or Work, where he suspects any Wrong may be done to the Lord of the Mine; or one Miner may order him to do the same in any other Man's Work, if he think himself Wronged, by the other any way Trespassing on him, where the whole, or major Part is called, then the Steward always attends them, and they give a Verdict to him in Writing, according as they find the Matter is; otherwise any Number under the major Part, deliver their Opinions Verbatim to the Barmafter, and the Person imploying them without any further Trouble. He is the common Cryer at all Courts, whether Inquests, or Barmote, always attending the Jury; and the gatherer of all Amercements, Meardishes, Copegrauts, Bloodwipes, &c. and if he any way neglect, or fail in his Duty, upon Complaint against him in the Barmote Court, his Insolence will quickly be Corrected according to his Crime.

BARMOTE-COURT.

A great Court held twice in the Year only for the Mines, it is kept at the Charge of the Lord of the Mine, who is obliged by a very antient Contract, made between him and the Miners, always to hold and continue the same, and settled by a Decree in *Edward* the Third's time, Enroll'd

roll'd and preserved amongst the Records of the Tower. As *Manlove*, an old Steward of the Mineral Courts above 100 Years ago, tells in his Book of the Customs of the *Low-peak*, and now in these Days it is known by the Name of the *Old Courant*, amongst Miners; this Court is the only Bulwark that preserves the Miner in his Priviledges, and the Lord in his Right; it is made up of a Steward of the Court and Barmaisters, all Ore buyers that takes up any within the Liberty are Summoned to appear upon Pain of an Amercement; on the Miners Parts all belonging to the Liberty are to Answer to their Names, having had due Notice thereof from the Barmaister three Days before, or be Amerced; when all are called over, the twenty four are chosen from amongst them, who are called the Body of the Mine. The Oath they take runs thus:

YOU shall well and truly enquire, and due Presentment make, of all such Things as shall be committed to your Charge, at this grand Inquest, for the Body of the Mine, not sparing any one for Favour, Fear, or Affection, nor yet Present any one through Envy, Hatred, or Malice, but according to the best of your Knowledge, and Evidence now Examined before you, and

So help you G O D.

The Jury being thus empannelled and Sworn, they are empowered to hear all Complaints, and Bills that are brought in before them; and to correct all Abuses, and settle all Differences that happen

happen between Lord and Miner, and Miner and Miner, and Farmer and Miner; now the most principal Things are, all Bills of Complaint that one Miner may bring against another, or against any other Person, for abusing any Man's Possessions, Boos-place, Bing-place, Shafts, Coes, Fatts, Washing-places, Buddles, or any of his Wargeare whatsoever; also making Fires at unlawful times, and not giving his Neighbour Notice of the same; Non-payment of Wages, Concealments, or any Thing that may cross, or thwart any of the Articles belonging to the Mine, and upon Complaint, the Party grieved may have Remedy.

BED-JOYNTS.

A parting in the Rock lying Flat, and parallel to the Surface of the Earth, (here I consider not Dipps) cutting it into such, or such a thickness, one under another, which Joynts are a very great help to let them rise up the better, whether it be by putting Stook-holes, or Blasting the Rock, the Stone lying between two such Joynts, is called a Bed of Stone, more shall be said of it when we come to *Stone-Bed*. If the Great Creator of the Earth, had not in his Wisdom, placed these parting in the hardest and firmest Rocks, it would seem impossible for Men to cut away through them.

BELLAND.

The Name of a Distemper that Miners are often subject to, the Miner is not Seized with it, but in Working upon hard Ore, the Dust whereof that arises from his Pick-point, being a very Sulphureous

Sulphureous Smell, gets into his Bowells, and causes a strange Costiveness, with Intolerable Pain for many Days together, (oftentimes) and the worst is, the Doctor's Skill does not easily remove it; there is a Practice now used by Miners, who though they blast in Lime, yet use to ram up their hole with Ore; this Smoke is very Dangerous to come into, and if much used causes the Belland, nor have we any known Remedy to trust to, for what is thought to Cure one, failes in another, yet to prevent the Distemper, it is found by Experience that to Eat a Mouthful of Bread diped in sweet Oil, when a Man comes Home from his Work, and refrain Drinking any thing first, (which is often the Miners Use,) or a bit of Bread and Butter that is fresh, is found to be good against it.

Buddle-places, Fatts, and Washing-places, are very Dangerous for Cattle to Drink in, as causing in them the same Distemper, and 'tis so pleasant to them, that having once found it, they will scarcely be held from it; but for them we know no Cure, in so much that in Customary Liberties, the Miner takes great Care of such Places, and if any Damage happen to any Mans Cattel by Drinking thereof, the sufferer may have remedy at the Court.

BELLY.

A remarkable Place in a Vein, where it breaks, that is where the Side or Sides suddenly part from each other, more than the usual compass of the Vein, hence 'tis a wideness more than ordinary, sometimes quick, sometimes dead, yet generally such

such Bellys prove oftentimes very well filled with Ore, and are the best and richest Parts of the Mine.

BENT.

In Veins when Ore flies out of its compass, not into both Sides but one only, and the other remains firm; this is in Veins that are something of the Nature of Pipes, these Bents break at some way-board, running along the Vein, some will have several of them, they are often the best part of the Vein, tho' the Vein carries Ore between them, and such prove very lasting Works.

BIBBLES.

A Level or Measure in some sort of Ground, in Sinking Shafts of uncertain Thickness, they being mixed with Clay, sometimes afford Water in Sinking through, if unmixed, will let the Water go through them, but seldom fail to have a Clay under them.

BILL.

A short Note given into the Steward at the Mineral Court, and by him publickly read to the Twenty four, and the Plaintiff being upon Oath is questioned by the Twenty four, so far as they shall think proper concerning it, if it be for Non-payment of Wages, it is drawn thus:

A. and his Groove Fellows complain themselves to this Court, against B. and C. or any one that claims under them, or either of them, for not coming in, and keeping Company with them, at Buxton's Groove in Winster Field
in

in Portaway Rake, being within the Liberty (and Jurisdiction) of the King's-Field, and Jurisdiction of this Court, and for not paying the Sum of Six Pounds, which is due for them to pay for Wages, being three Pounds a-piece for each of their Sixth Part to pay, and therefore pray Relief.

If the Defendant can Object any thing against it, he puts in a Crois Bill after this Manner :

Whereas A. and his Groove-Fellows have complained themselves to this Court, against B. and C. or any that Claims under them, or either of them, for not coming in and keeping Company with them, at Buxton's Groove, &c. and for not paying the Sum of Six Pounds, which they say is due for them to Pay, being three Pounds a-piece, for either of our Sixth Parts; we the aforesaid B. and C. do hereby declare to prove the payment of the aforesaid Six Pounds, for either of our Sixth Parts, and therefore pray to be dismiss.

By what is already said, these seem to be very good and laudable Customs, for keeping good Rule and Quietness on the Mine, and the meanest Labourer may recover his due Wages at the Barmote-Court, or seize on the Work; or at least on his Part, from whom the Wages is due.

And because Maintainers have the Liberty, how long soever the Miner will trust them for the Payment of their Wages, to either Pay or turn up their Parts for default, to the Person or

to some other that will pay the Money down; yet in one Place or Liberty, they have an Article amongst the rest, called the Three-Weeks Article, where by the Assistance of the Barmafter and two of the Twenty four, any one may recover his Wages every three Weeks, or have Possession of the Party's Work.

And here is one Question which has often been Argued upon by Maintainers of Mines, whether a Man had better venture his Money in one of these Customary Liberties, where all things seem to be done with due Consideration upon Oath, or where Mines are taken and held upon Leases for a Number of Years, where there is nothing but a loose way of dealing; this I take to have more Regard to the working Miner, than he that is the Leaser, for no doubt but his Lease is so drawn to secure himself; but then he is at full Liberty to use what arbitrary Power he pleases over his Miners, because they have him not tyed up by any Customs; and many have (both Miners and others,) suffered great loss by such Persons or their Agents, one way or other, but such as these, (tho' too common) keep still driving on a Trade from one Place to another, and where they stay least, the Place escapes best, far unlike some noble and honest Adventurers, who wherever they come, the Country always fares the better for them; but I degreis a little, and am apt to think that a customary Liberty may be best, because there is Remedy to be had for all wrongs, and abuses relating to the Mine, and that without any delay or much Charge;
but

but then such Customs have been and are abused by villainous, knavish Men ; but the fairest play is, when one Miner contends against another, as being Men of equal Size, but where great Men get footing amongst 'em, there is as great Knavery, (and may be justly feared) Perjury and Injustice, as in any Court, Law, or Business whatsoever, for great Men and Money do great Things ; and the Rule is not to starve the Cause ; and no Money, no Mine. *Dryden's Juvenal* says all at once. *Sat. XIII.*

*Bribe is a favour that Asserts his Cause,
Pronounce him guiltless, and eludes the Laws.*

'Tis for these Reasons I can say no more of it, only thus much may forewarn any that has a mind at any time to be concern'd with them ; but I have one form of a Bill that is used at small Court-Barmote, for the Tryal of Titles, as follows :

D. and his Groove Fellows, Complain themselves to this Court, against E. and his Groove Fellows, for unjustly entering and detaining from the Complainants, one Founder Mear of Ground in a Cross-Rake, to the old Rath-Rake at Bradwall within the King's Field, and Jurisdiction of this Court ; and also for one Taker-Mear of Ground Eastward, or a Possession for a first Taker-Mear, and for getting therein and carrying away a hundred Leads of the Plaintiffs Lead-Ore, and converting it to the Defendants own Use, to the Plaintiffs

*Damage of 160 l. and thereupon they bring
their Suit, and crave Relief.*

And now I think I have been long enough
over this, and shall proceed to the next, which is

B I N D S.

Beds of Stone that always lie mixt with a cer-
tain thickness of Shale, or Clay between them;
their thickness is of all Sizes, from a Hands breadth
to two Foot, and may be more; they are com-
monly black Stone, very hard and sharp, the
less or thinner the Shale, or Clay-Beds are be-
tween them, the more nearer they resemble the
Nature of the approaching Ouges, and are easi-
ly distinguished by the Experienced Miner.

B I N G - O R E.

The largest and best, and purest of the Ore,
when it is Chipped, Drest, and made ready for
the Merchant; where they sell it by Weight, it
is made Clean in Lumps and Pieces of all Sizes;
in Customary Liberties where it is sold by Mea-
sure, it is broken into small Pieces, about half a
Pound Weight or such like, the better to make
sizeable Measure.

B I N G S T E A D.

The Place made on purpose where the Chip-
pers and Dressers, throw their Bing-Ore as they
Dress it; 'tis well boarded or planked in the
Bottom, that it may be more easily Shovel'd up,
and to prevent being troden under Foot into the
Earth.

B I T T S.

I mean those we bore holes in the hard Stone
with

with in Blasting ; for those that are used in boring through hard and wet Shafts, I will Speak of them hereafter when we come to *Rods*. The Bitts for Blasting are of three Sorts, first square at the Shoulders, and seldom above an Inch in length, before it ends in a sharp Point, the square is very true made and keen withal, and a little hollowness of the Sides betwixt the Edges thereof ; these are the most Antient and much used in my Memory ; the Winged Bitts, these are but of small Use being so slender, except the Stone be very fine and kind to bore ; and also they are harder to make, or sharpen when blunt, and so subject to break, that now a Days no body uses them, nor knows which they are ; the third sort is Chissel Bitts, the best, and now all in Use ; they are made of what Size the Miner thinks fit, they are commonly about an Inch broad taper'd to a sharp Edge, and if they be of good Steel and well Tempered, will cut itself away into any Stone whatsoever it be. (*Black-Jack, See Mock-Ore.*)

BLANCH.

A Piece of Ore grown in the hard Rock, or in hard Sparr or Tuft, or any other hard Stuff, without any Softness or Leath at all about it.

BLASTING.

This is a very principle Piece in Mineing, and any young Fellow will pretend to it, that can bore a Hole and put Gunpowder into it, and when he has done set it on Fire, so the Noise he but heard all is well ; but if more Care and Pains were taken about it, it would be much better ;

ter; for the Gunpowder is able if good, to raise much more Stone, if rightly applyed, then these youngsters think of, and therefore I design to be more diligent in explaining it.

The hardest Rock that is may be broken with Gunpowder, by observing in the first Place a Conveniency for the picking of your Hole; if it be not as we would wish, we use our endeavour to make it so, or at least as near as we can, by cutting some of the Stone, which may be done with proper Tools, (for here I am for speaking only of making way through a Rock in which is no Sticking,) formerly the old Miners used to Cut it all with Picks, but now in many Places 'tis all done with Gunpowder; and the way is, to consider wisely to set one Shot to free another, always contriving to have it as side-loose as possible, that none may be in vain; large Gates are often taken where this is practised, whereby to have the Advantage to point the Noger at Pleasure; this is one way to Cut the Rocks by Blasting; the next is where there is a Sticking, and if it be a soft one, Blasting will turn out the Stone apace, but if your Sticking be hard, more Pains must be taken to slit it, and make it fit; for this is a general Rule, that it is never convenient and fit, until one side be freed and made open, so far as the length of your Hole at least, (what is further, is so much the better) where you design to Cut the Stone out by your Shot; and this must be observed, let your Blasts be for lifting or weighing down, Roofing or Sinking, forwards or towards you; and that it may do the better Execution, we ought warily to consider
and

and search whether any Joynt or Joynts be there, of what Sort soever, shall appear in the Rock, and whether they may be likely to help, or hinder the Powder in the Hole in its Working, then we may the better pitch the Blast, or point the Noger to the best Advantage; for 'tis a certain Rule that a Blast bored in or sometimes near a Joynt, is only lost Labour; and as I said before, any Body may bore a Blast, but to understand the matter well, requires some Discretion and Judgment, and this may suffice to shew how we contrive for the Hole; but then it may be demanded, how we manage the Gunpowder, which is as follows:

We have three several ways, by which we can compel the Gunpowder, rather to force thro' the hardest Rocks, than to come forth the same way that we put it in. First by an Iron Plugg and one Feather, or a Plugg with two Feathers, (I shall describe them in their proper Places,) we make a Cartridge of brown Paper, (something longer then the Hole we have bored) and put into the bottom of it, 3, 4 or 5 Inches of Gunpowder, according as we think the Strength of the Rock will require, and put the Plugg into the Cartridge close on the Top of the Powder, it being first Primed, and tye all fast together with a Thread, and then put it into the Hole, where about half an Inch of the Plugg stands forth of the Hole, that you may the better apply a Match to it, then we drive in the Feather or Feathers, and set the Matches thereto and Fire it; and although this way be very Danger-

ous

ous, being apt to Fire the Powder in driving the Leaves, yet it was most Practiced, and Men very often killed, or at least bruised and maimed, all their Days after, or if they escaped with their Limbs whole, they are often times burnt Blind by the Force of the Gunpowder, and there are Men now living, that have been thus hurt Twenty Years ago, whose Faces have been discolour'd by the Powder by such Mischances, that it is not yet worn out, nor perhaps never will while they Live; but some will think that the Workmen may stand out of its way, (and so he does when he can,) but Sides are so near one another oftentimes that he cannot; for who would run the risk to be shot thro' the Head or Body by those Iron Instruments, which is done at one Stroak, and many Miners have died so.

But the second way of Blasting is lately come into Use, and now called the New way, and it is very safe with small care, and is thus: After the Hole is bored, and made very dry, the Powder is put in (if it will run down) naked, the Quantity being proportioned to the Stones Strength, (but still this is not so safe as to make Use of a Cartridge, for sometimes it has miscarried) pressing it a little down with the weight of the Rammer; then we put in the large Pricker into the Powder and fall to Raming it, and this we do with any thing that is dry; such as dry Clay, Sparr, soft Tuff, Cawks, Brick, dry Raggs, or any such like things will do; and then you must observe, that at every time you
put

put in your fresh Raming, that is the Stuff you Ram with, to turn your Pricker * round, and so keep it loose, so that you may draw it forth at last, or all will be in vain; when the Hole is Ram'd full, put some good Clay on the Top of the Hole, close round the Pricker as a Cover; this is done to prevent any of the loose Raming from falling into the Hole, as you draw forth the Pricker; next draw out the Pricker, and then we have a small Wyer which we put down, and then put in Powder, which by the help of the small Wyer you may Ram it very securely to the Charge below, until the Hole be full, but this is in such Holes where the Powder may have Descent enough to run down; otherwise if it have not, we make use of a Wheat Straw, that is of a sufficient length to reach the Powder in the bottom of the Hole, and open it on one Side all along, and fill the Cavety with Powder, † this done we put it down to the Powder below, and have always some of the Straw standing out of the Top of the Hole, to which we apply a Candle Match, and set it on Fire, but we make sure to give it time enough to get away, and if this be done I see no other Danger that is to be feared in this way of Blasting.

But here may be a Question asked, how I will do to Ram my Hole if it be bored Slanting as this Line , or directly upwards thus ; to this

C

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* If you get a Bryar Dry it and burn out the Pith, fill it full of Powder and put it to the Charge, you may Ram up all together, without using a Pricker at all, and the better way.

† Or if the Powder be small enough, fill it full.

I answer, some Miners in this case use a Plug and Feather to their up Holes, thinking it may not be Ramm'd upwards; but this is because they have never tryed otherwise, but it may be done easy enough, by putting the Powder in a Cartridge, and putting it up with the Rammer a little fast; and after it a piece of Paper, or a Ragg to hold it, and then such small pieces of Raming as the Hole will receive, and forcing them up with the Rammer, and putting in a Straw as aforesaid.

And now I think this Difficulty is answered, but here arises another more hard to be managed, and it is this: When we light of a Spring of Water in boring the Hole, what must we do then? Why formerly, we were wont to besmear the whole Cartridge very well over with Candle Grease, and put into the Hole, and making all possible hast to Fire it; but since we have this new way of Blasting, we do thus: If the Water come near the bottom of the Hole, we Ram it up to the Place very fast, and it will hold out the Water; but then we must content ourselves with the shorter Hole, but if the Water come higher in the Hole, we Ram it up higher, and having so done, we bore it forth again, * with a Bit of a lesser Size, than what we bored the Hole with at first, holding the Noger pritty Steddy and carfully in the middle of the Hole, so then part of the Raming sticks fast to the sides of

* Hard Clay driven down with the Rammer, and the Rammer pulled forth again, and the Sides of the Hole scraped, will hold out while you let it.

of the Hole, and keeps the Water forth for a while ; but then this Raming must be bored forth dry, or else it will otherwise not do at all ; however in Danger of Wet, let your Charge be Greased as abovesaid.

I have heard some talkative Miners boast of their Blasting under Water, but as it is not a thing common, so I believe, there is not many has done it, nor did I ever see it done in my time ; but yet where some special Piece of Service may be done by a few Shots, otherwise 'tis never Practiced ; and a very good and Experienced Miner assures me he has done it, and his Method was as follows : To have a Plug made of a sufficient Length, that it may stand out of the Hole so far that the Water will not rise to the Top of it, while it is in putting of, and fitted for one Feather, and this Plug must have a Hole drill'd through the middle of it to Prime it ; then within half an Inch of the end next to the Powder, must be made a Nick clear round it, and the Cartridge must be made of a Cows Pudding, that is dried and fit for the Hole, and the Powder being put in, the end of the Plug is put upon it, and the Cartridge is tyed fast thereto, with a strong Thread in the said Nick, and this secures the Charge from Water, this done the Plug is Primed, and then put into the Hole, altho' it be full of Water, when the Leaf is driven, but care must be taken that the Leaf be not so long as to reach the Cartridge, for fear of breaking it. And thus far my Friend shews the way, which seems very reasonable, and likely to be done ; and he

says further, he never saw it used but for letting down a Pump Foot, or taking of some Part of the Rock to set them straight, &c.

But here is another way of Blasting, which is the last I have to mention, and that is with the Gablock, formerly very much used in some Places, but most commonly in Sinking; the Powder being in the Hole Naked, upon it put a Plug of Wood, about two or three Inches long, or more as need is; this Plug has a Riggot made in it down the Side, or rather a Hole bored through the middle of it with a little Gimlet, by which it is Primed, and then dropt upon the Powder in the Hole, then a little more Powder put in upon the Top of it; after this the Gablock end is put into the Hole, and must reach down to the Top of the wooden Plug, which is about 4 Inches within the Hole, and having a Riggot ready on the Side thereof, by which it may be Primed; the other end of the Gablock is set fast against the contrary Side, in some sure Stope, that may not give way, and it will either get the Stone or break the Gablock.

Note, The end of the Gablock that goes into the Hole is always bent a little, which makes it more fit for the purpose, this way destroys the most Gunpowder.

BLOODWIPE.

A drawing of Blood upon the Mine, by any manner of Violence that one Man can offer to another; and the Party so offending, or drawing Blood, shall Pay into the Hands of the Barmaster, the same Day before Sun set, sixteen Groats,
or

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or five Shillings four-pence, or else the same is to be doubled every Day after, 'till it come to an hundred Shillings ; and then for default of Payment, it is to be recovered by the Barmafter, who may Arrest his Ore or Mine for the same.

BLUNTIN.

A black sort of Tufft, something soft to cut, but tough withal, wearing the Points thick and dull, though they seem Sharp, but the Square Corners being gone, they will not Bite or lay hold of it.

BOKE.

Is a small Run sometimes in Pipes, seeming at first to Appearance to be some new thing, but upon working, dwindels out to nothing in a short time.

BONT.

A hard Gripp in a Vein. (*See Twitch.*)

BOOSE.

All quick Veins afford Boose, if not round Ore ; Boose is that part of the Vein, that in cutting the small or lesser sort of Ore cannot be seperated from it ; the Miner always picking it, and making it as clean from Stones, Clay, or any other Deads and Rubbish, as may be ; out of this comes all the Wash, or small Ore, being seperated by Budling and Washing.

BORING.

Is common as boring Blast-Holes, Clieving-Holes, and sometimes Holes between two Places, to let Water go, or have Passage for Air ; and also in
hard

hard and wet Shafts, which is of all boring the most Difficult; and because some may think it strange to bore the hardest Rock, yet it is no more than what any Boy that is used to the Mines can do, when he is shewed how to Point his Noger aright; and we do it thus: First make a Place or Stope in the Stone with a Pick, to set the Noger Point in; then one holds it with both his Hands, and another Strikes on the Head, or top of the Noger, with a Hammer about five or six Pounds Weight; and he that holds the Noger, moves it a little off from the Place every other Blow that is Stricken, and by putting Water into the Hole it will presently be done.

Miners often bore themselves, and turn with one Hand, and Strick with the other. About forty Years ago, some Gentlemen came to a Place call'd *Ecton* in *Staffordshire*, there for to venture at an old Work, which was drowned with Water, in hopes to get Copper, (it being reported to be a Copper Mine) but no old People in the Neighbourhood could give any account when it was last wrought; they got Churn-Pumps, Sweap-Pumps, and Forces, and got at length to bare the Soles, and the Water proving very easy, (though they struck it a very great hight) they got great Profit; but in the Work it was admired by all Miners that saw it, what Blast-Holes had been bored, most a Yard or four Foot long, and two Inches or more Diameter, so that in those Days they used not such small Holes as we do in these; nor did I ever hear that any of their Blasting Tools were found in the Work,
so

so that it may be a Question whether they used any Plug, or Leaves to their Shots, or understood the way by Raming; the Report was that they were *Dutchmen*, others say *Germans* that was their Workmen; but be they who they will, we are sure some *German* Miners from * *Saxony* brought us of late Days, this new way we now have of Raming.

But to return to boring of hard and wet Shafts through; and here we suppose the Forfield to be driven so far as may be (which is always done at the Top of the Vein, or where the Vein lies far off, some other Gate is cut, as in Shale, &c.) for want of Wind, or other inconveniences, but want of Air is commonly the chief Impediment, then having exactly dialed it, to the Place where you would have your Shaft to come through, and laid it out at the Day upon the Surface, with the same Care, and having Discovered the Place you pitched upon for your Shaft to fall, you fall to Sinking; now if this Shaft prove hard, and very wet withall, that little can be done for Water, in such a Case, it is the best way to bore it through, that the Water may be clear let off.

This Boring we mannage after this Manner: First having got the Water out of the Shaft, we pitch upon the Place where we will begin to bore, and place a Trunk thereon, and have the end next to the Hole made full of small Holes in the Sides thereof; the Sludg that comes out by boring, may the better work out from the Top of the
Hole,

* Mr. Brown in his Travels says, they Rammed up their Holes in the Mines in *Hungary*.

Hole ; and this Trunk is fet fast and fecure, with Stemples and Stays, that it may not stir from its Place, and this is to guide the Noger Bit into the Hole, and then up higher in the Shaft ; we place a good Plank or two, or three if it so require, one above another, at a fit Distance, with Holes in each of them, and as perpendicular upon the Hole as may be ; and lastly, at the Top of the Water where we are sure it will rise no higher, there we make a good Bunding to stand on, with a Hole to put in the Rods ; then they must be managed with a great deal of Care, for the Bit in the first Place must be proportioned to the Depth that the Hole must be bored ; and suppose it be bored 20 or 30 Yards, we consider what Measures we are to go through such as Shale, or Binds, or Stone, or some Chirt-Beds, in such case the Bit will often need Sharpening, so that we draw them the oftener for fear of making the Bits to Blunt, if they be worn a little Bald on the Corners, they must be Sharpened, that the Hole may loose as little of its Compass as may be ; and at every time the Bits are Sharpened, an exact Gage must be taken of the blunt one, that the new Sharpened Bit be made no bigger, and this is the care of the Smith as well as the Miner, or else we shall soon make the Rods fast in the Hole. A Man will scarcely ever loose a Hole, if he take but due Care, and have his Rods of good Iron, and good Steel for the Bits, and good Screws, (for I do not at all like Sockets and Cotters) and a Skilful Smith to keep them Streight and in good Order.

When

B O

When the Rods grow too heavy that one Man cannot manage them, then a Rope is fastened to the Top of them that is about the Turntree, and here is fastened a turn of Iron, that the Man at the Bunding may turn them round, by a small Handle of Wood fixt in the top Rod, two Men raise them up by the Turntree, and let them fall down again, and their own Weight is a violent Stroak on the bottom of the Hole; and for drawing up the Rods, we have to hold them an Iron Instrument called a Bitch, and for unscrewing them, two more we call Dogs; and besides when Gravel works not aright out of the Hole Top, we have a cleansing Bit to take it out.

Bottom.

This is an improper Mineral Term, thrust in by Maintainers for the word *Sole*, (which I shall Remember in its due Place) so that now it is commonly said at the Bottoms, bottom of the Shaft, Sump-Gate, &c. formerly it was used only to Bottom-Springs, such as belong to a level Water.

BOOTIT.

A Term always used for loss, and never made Use of in Ventures, and Trials, that have got no Ore, but in such Works as have, or do get some Profit, as in saying, this Reckoning my Part got me thirty Shillings; last Reckoning I Booted it thirty, &c.

BOUT.

This Word is used in Measuring of Ore, and it is either long or short, the long Bout is 24
Dishes

Dishes, the short Bout is 12, where a Groove gets a great deal of Ore; a Miner can hardly keep it, for one or other will be buying of him some Share, or part of it, such as a 12th, 24ths, 48ths, and sometimes 96ths, which may be shar'd amongst three or four Partners; and then it may so fall out, that four or five, or more of our Ore Buyers may be concerned in taking up the whole Ore, for every Partner in the Work may sell his Ore to whom he pleases; now to avoid Mistakes, and Wrangling, before they begin to Measure, each Ore Buyer gives an Account to the Barmafter, whose Shares or Parts he takes up, which let us suppose to be as follows:

An Ore Buyer for one Man, one Twelfth.

For three more, three Twenty-fourths.

For other three, three Forty-eighths.

For five more, five Ninety-sixths.

For five more, two one hundred Ninety-seconds.

* The Sum of all these are eight 24ths, which is one third of the large Bout; therefore he takes up eight at the Bout, or one third of the whole Ore; the like is done of the rest, and if all their Parts that they take up, fall exact in with the Bout, they begin to Measure, otherwise it is wrong be it more or less; when they have done Measuring, they account the whole to be so many Bouts, as suppose 24 Bouts

* The Printer having no Characters at hand to express these Fractions, they are written at length in Words; whosoever will try them in Figures, will find them to be right.

and one half, that's Sixty-four Loads ; the short Bout is used where lesser Quantities are raised, and the whole Groove not divided into such small Parts, for the richest and best Mines, are commonly fold into the most Shares.

BOLES.

There is remarkable in some Places in several Countries, certain Places which are called by the Name of *Boles* ; they are found upon high and plain Grounds, that lie open and exposed to the Wind, and in these Places, by the Cinders, black Slaggs, and Lead found within them when broken, and small bits of Lead themselves, and Ore, some bits Pure, others much altered by the Fire and half Melted, which without doubt has been a way of Melting it, before Harths and Furnaces were much used ; and in some Places have been found such large Quantitys, as have been thought worth while to be carried off to some convenient Place fit for the Purpose, and have been knocked, and washed, and good Profit made of them. There are places where we may suppose that the Lead-Ore has been carried several Miles, for the conveniency of Air, to a fit Place, because we see no Mines to have ever been near them ; but above all, upon the Hills, call'd Stiperstones in *Shropshire*, there they may be found very common, and are very little Places, and they seem to have done their Business by laying a Round row of Stones on the Ground, and placing the Fire in the middle ; they picked the Ore on, or near the Surface of
the

the Ground on those Hills, and perhaps melted not one hundred Weight in one Place.

BRANDRIC.

An Iron made and shaped fit for a Place at the Foot of a Rag-Pump, to make the Chain enter in the better, and keep the Pump from Wearing.

BRASSIL.

A hard Substance, and Fiery, and somewhat resembles Brass in colour, but yields no Mettle as we Miners can tell of; some Veins that are Caukey, are very subject to it, but more especially in Twitches, and hard Places; it is no Friend at all to the Ore, but often eating it out (or making it much worse,) and standing of a Ribb in its Place; 'tis always hard, taking a Point at a few Stroaks, and as full of Fire as any Chirtt, and yeilds the most Sulphureous Smell in cutting, of any thing I know of in the Mines.

BREAK-OFF.

An Alteration in a Vein, made by a jumbled Place, or Lumb of Softness; many large Joynt or Joynts, which do disorder the Vein, and may be throw it to some Side for the present; there is no way in such Places to be done, but a Skillful Miner, to use his Discretion in working to Recover it again; now in such a Place there is some Difficulty, in such Mines as are Subject to Custom, and ought to be carefully managed, lest at unawares a Man make himself obnoxious to a Penalty or Forfeiture, and need not.

If

If it happen in such a Place, that after driving some Space, the Rock be again recover'd, and some leading set forward therein, then observe whether such leading keep its Course according to the Randome of the Vein already Cut, and with any part of a Side would be well, or yet if therewith there be left in Sight, any small Pieces of Ore passing through the softness to the face where the Vein sets in again, it must be in all probability the same Vein; but if it happen that it break into several Leadings or Strings, and so as to Appearance a Rider between them of considerable thickness, which may be likely enough to prove to be a firm Side; but yet it may not be depended on, until we have made it Serviceable, that is driven by it half a Mear in length; in which case, having two Strings or more, and they bear Ore worth Cutting; I am obliged to Free for a new Vein, or Forfeit the same to the Lord, according to our Articles. Some have thought, that freeing in this Case, as soon as it is made Serviceable might be in good time enough, but 'tis not so, for by the Articles, we are to free our Vein, with the first Ore we get in it, and the Miner that is aware of this, will upon his Measuring, give to the Barmafter the first Dish, and tell him what he gives it to him for, and on what Side it lies of his old Vein, and desires him to Note it down in his Book; and thus for the Hazard of one Dish of Ore only, a Man may keep himself safe; and I have known some good Veins lost, by this very failing.

BRAZEN-DISH.

BRAZEN-DISH.

The Gage or Standard (in the *Low Peak* more especially) made of Brass, and Chained to a certain Place, where it is kept by the Bar-master, by which all other Dishes or Troughs are Measured and made Sizeable thereto, which are used and carried about to the Miners throughout the whole Liberty, for the Use of the Miners to Measure their Ore by; the Measure in the *High Peak* is something larger, so also in some other Places; our Custom in Measuring, is to make it as Level and Equal with the Top of the Dish as possibly we can; if the Bar-master shews us a Fault, we amend it, and are not obliged to take any Notice of what the Ore-buyer says; and the Buyer is not to touch the Trough with Hand or Foot, nor lay the smallest Piece of Ore thereon, but when made ready to Start it.

And here give me leave to make this Remark, that Measuring of Lead-Ore is of greater Antiquity than Weighing it at the Mines; four hundred Years ago it was Measured, and the Measure the same as is now, and in those Days the Miners call'd their Customs Antient, and 'tis from them we now derive it; and 'tis very probable that if some rich Mountains now in *Wales*, had, had their Veins breaking out to the Day, (as in the *High* and *Low-Peaks* they do) there might have been more King's-Fields than in *Derbyshire* only.

BROWN-HEN.

BROWN-HEN.

A hard kind of Soil of a brown colour, sticking fast to the Ore, and often makes it look worse than indeed it is; after beating and knocking it with a great deal of Pains, yet it will still be Tagged therewith, to the disadvantage of the Miner in selling it.

BROUSE.

A course sort of Stoping, such as Chaggs, and the smallest Boughs of Trees, put into the Pannes, at the Back of the Stoprods, or Bangrets in Sinking, (more commonly) to hold the Geer from falling down.

BUDDLE.

A kind of large Trough, six or seven Feet long, and two Feet or three Quarters of a Yard wide; this is made of strong Planks, especially the Bottom and Ends thereof, with a Hole about four Inches Square, cut in one End in a Corner at the Bottom, and this is for to let out the Sludg and Buddle Water at Pleasure; in this in some Places, they Buddle all their Boose, whether it be Soft and mixed with Clay, or Hard and without Clay, and also their Smytham; but then they must have clear Water enough, otherwise the Smytham will look bad by the Muddy Water hanging upon it; but the best way and now most in Use, is those called runing Buddles, by Dressing in which, (if there be sufficient Water,) is the readiest and best way of all.

BUCKER

BUCKER.

An Iron cut out of some strong flat Bar, about five Inches long, and four in breadth, and three Quarters of an Inch thick, with a Loope of Iron fastened on the one Side, to put in a Handle of Wood, with this they knock Ore, or any thing that is mixed with Ore, Fausteds, &c.

BULE.

That Part of a Corfe that is fastned to the Bottom, and both ends Bent, or Bowed in the Top like a Semecircle, about which the Clive-fes is Clasped, to be drawn up or let down as occasion serves.

BUNDING.

A kind of Scaffold, made in any Vacancy already cut out in the Work, but always some room reserved under it for Wind, or Water to pass, or for some Gate, or some other Convenience as the Miner shall contrive and thinks fit to answer his Purpose best; they are made with good and strong Stemples, firmly set between the two hard Sides at a convenient Distance, so as to be able to bear the Weight designed to be put on them; then upon these Stemples are laid Bangerts or Crufts of Boards, or any course Slabbs that will hold the Weight between the Stemples of what is to be coated thereon; in Scrins they are usually made by Choaking in long Stones between the two Sides, instead of Stemples; Shafts are likewise Bunding'd over when the Miner has done with them, if any Sides be to the Day, rather than bestow the Pains to fill them all up.

B U

BURR.

A hard Knot or Lump in the Vein, or Sticking, of Caulk, Chirts, Kevells, &c. mixt with the Ore, or the Ore it self, when it is more harder grown together, than the Nature of the Vein is wont to be.

TO CADG.

It is puting the Clives under the Corfe Bule, and Claiping them about the Rope again; so that by so doing it makes a Noose, into which when any Tools are put into Corfe, we put the Pickhaums therein, and draw the Noose Fast, and thereby they are held from falling out, in letting down and drawing up.

CHADGER.

Any thing that is made fast in the Rope as aforesaid, but without any Corfe being thereat, as great Stones, &c. and sometimes pieces of Ore, as Rarities to look at.

CANDLE-MATCH.

A Match made of a Candlewheeck or Part thereof, or of a small bit of Paper, twon up and Greased well that it may burn, about two Inches long, and this we Place across under the Powder Match, to set it on Fire, but give it time enough to get away.

CANN.

The lower part of a Churn-Pump, on the Top of which the Lid is Nailed.

CARRYING-GATE.

The chief Passage and Road in the Mine, and

cut fomewhat larger and kept in good order, be-
caufe it is of constant daily ufe, to pafs and re-
pafs, and alfo for the Carriage of whatfoever is
got that muft be drawn up to the Day.

CARTRIDGE.

The Paper into which we put the Gunpow-
der, when we put it into the Hole in Blafting ;
and we make it after this manner : We have a
round Stick, made of fuch a length as we think
fit, which let us fuppofe to be feven or eight
Inches ; it is fo made that it will go down the
Hole, with a Piece of Paper wraped about it,
juft as one Side will reach over the other about
half an Inch ; then make the bottom of the Car-
tridge firft, by crifping down the Paper with
ones Fingers clofe to the Sticks end, and a fmall
bit of the Paper remains, to which we faften a
Thread, (and it ferves to draw it of the Car-
tridge-Stick) and then holding the Cartridge
with this bottom upwards, we put the Thread
over the end of it by halches, and draw them
clofe as we fee fit, till we think we have made
it long enough, then we draw it off the Stick,
and put in the Gunpowder, and making the end
up, it is done ; fome Miners feldom ufe Thread,
but ftick the Edges of the Paper together with
Candle-Greafe or Clay, but this is a flight and
unfate way. But we have another Cartridge,
for when the Miner Haums a Pick, there is al-
ways fome of the Haum comes through the Eye
on the other Side, and when he has put in his
hard Wood-Wedges, and Iron Kyles, and all
finifhed, that part he calls the Cartridge.

CAST-

CAST-HOLE.

When a Miner discovers any Signs of a Vein by Proping, he falls to cutting a Square Hole, about a Yard every way, throwing out the Earth as far as he can with his Spade, which will be (if need require) about three Yards Deep, and this is called a *Cast-Hole*; but if he once set on his Stoce, and Turntree, and falls to drawing, it looses that Name, and is called a *Shaft*.

CASTETH.

That is when the Air comes up a Shaft, and may be seen at a Distance in the Morning in the Winter time, rising like Smoak, especially if the Weather be calm and Frosty.

CATDIRT-CLAY

A kind of Clay that is short in cutting, and mixt with Joynts that are whiter than the Clay itself; it being a Dun, or the colour almost of rotten Stone.

Cause, *See Coulch*.

CAVERS.

Poor People in customary liberties that go daily to the Mines, carry a small Wiskett and a Hammer along with them, picking up all small bits of Ore they can find, which they take with 'em home, and dress, and sell to the Ore-buyer; these *Cavers* dare not come to any Man's *Grooves*, when no Company is there, nor dare they Measure their Ore, but by the Lord's Dish Trough, for fear of Punishment.

Charge for a Shot, *vid Cartridge*.

CHARGE the JURIES.

This is Declared before, when we spoke of *Barmote-Court*.

CHASING the VEIN.

Many Veins that are little worth, are Chased along by Proping or Castholes, and not taken much Notice of; but in those that are quick, this Chasing the Vein forwards along the Field, the Miner is obliged to do, and cannot Work his own Ground at his Pleasure, but must Work it without delay, except some Impediment hinder him, as want of Air, or overpowered with Water; that so the Mine may be Chased from Stool to Stool, of which you shall know more when we come to that Term.

CHIRTT.

One of the Sharpest and Fieriest Substances we have in the Mines, and more especially where it is mixt with the hard Stone; otherwise, where it lies in a Body of considerable thickness, it is more Brickle and Joynty; this sort will wear a new Steel'd Pick off, in three or four times Sharping; it is of all Colours, but mostly Black with Redish Joynts; in some Places it carries large Veins of Strong and Solid Ore.

CHEE-STONE.

A Stone that by Reason of some Joynt, slips further into the Side than ordinary, and by, and by with some slant Joynt, turns in again to the Sticking, making it sometimes kinder and better, that is most Observable in the lesser sort of Veins, and Scrins.

CHILL.

When by the Stroke of a Mall, or other Tool, we try the Degree of fastness, any Rock or Stone hath, which may be discerned to a Nicety; and thereby we know how far we may trust it, in standing or falling; this cannot be well known to any one but by Experience; our way is to lay one Hand on the Rock, Stone, or what ever else it is, and strike gently, or more hard as we feel it Chills; the more faint and languid the Motion is, that is caused by striking the more firm, and fast it shews it to be.

CHINK.

Any small Crack in the Stone, or in any Joynt that stands open, and is often of good Service to the Miner, in taking some Water that may trouble him, or some such a Chink may afford him some Wind.

CHIPPERS.

Those that Dress the Round or Bing Ore, which is commonly the Business of Women to do it.

Chippings, *See Scafflings.*

CHISSELS for LOUGHS.

A piece of Iron, like to a Noger, about two Feet long, or as we please, to fit the purpose; it is Steeleed at the end, and has a sharp Point like a Pick, with this and a Hammer to strike with, we Chissel the Ore out of Loughs in Pipe Works, where a Pick cannot be used to get it.

Chissel Bitts, *See Bitts.*

Choaking Shafts, *See Bunding.*

CHUN

CHUN.

A leading of Clay, or other soft Soil, setting betwixt two hard Sides, and Sinking down; these are the Leadings that Spring up from soft Pipes, and cut through the Lids to the Top of the Stone; there is more to be said of these Chuns, but it will fall in more Part, when we come to *Founder*.

CHURN-PUMP.

It is composed of a Toppiece and a Cann, well joynted together, a Rod and a Pump-Shoe of Leather; 'tis much used in Mines, where the Water is not too strong for it, and also in Buddleing, and washing Places.

CISTERNS.

Made of Planks well joynted together to receive or catch Water at some convenient Place, out of which it is drawn by Pumps, Engines, Barrels, &c.

CLAUNCHER.

A piece of Kevell, Tufft, Stone, &c. having always some Joynt at the back of it, which being driven past becomes loose, and being struck upon yields a Sound, and often slips down unexpectedly, and many times Ore has been discovered at the back of such Claunchers.

CLAY.

In the Mines we find divers Kinds and Colours, some are very coarse and rough, others very fine, and some of a mixed kind, and there is one of a particular sort call'd Livery-Clay, being short and good to cut; its Colours are sometimes
white,

white, some black, or brown, dun, yellow or red; some Veins do carry the best Ore in Clay, in others, it is an Enemy to it; all Clays are generally Stiff and Tough in cutting, and some very hard; I know a Clay that is at least six Fathoms thick, and covered many Fathoms with Lime Stone, which carries good Veins, yet they are cut off by this Clay, which is so hard that it cuts like some sort of Stone, and when drawn to the Day, it will in a little time Moulder, fall and melt, much like quick Lime, with a few Showers, but then it is Greasy and Slippery like Soap.

All Clays are heavy on Timber, but some are far worse than others; and *Note* this as a general Rule, That a soft and moist Clay, will never break Timber like that which is more hard and dry, therefore in Timbering the latter, it is our way to give it room enough, that is to put the Wood so loosely in, that it may swell to it to fasten it; yet in some Clay this will not do, tho' it seem Stiff in cutting, and for that Reason likely enough to stand, yet in a short time it will begin to open a little, and slips off at certain Joynts, which will discover themselves, and look very Slippey as if they were Greased; these it may be thought by the help of the Air, * let loose such massy Pieces, that by their Weight leaseureally settling Rives and breaks Timber most strangely, always pressing the

* We call it taking Air, that is when a Way is cut in such Clay, the Air let in makes those Joynts to open as commonly in the Sides as Roof, and the very Sole of such Gates will rise, or swell upward.

the Sumps or Gates together, so that a Man may cut it fresh over again, without any Danger at all of it running in. This sort of Clay is never mixt with any Beds of Stone, nor any Joynts but these Greasy ones, except sometimes a flat Sand, and then there is great Danger of Water; if the Seat of a Vein happen to strike through such Clays, it will appear a great Tankey Joynt, and attended with small Chirts, Cauks, &c. according to the Nature of the Vein. There seldom happens any Ore in such Places, except a Side lies very near.

CLIFT, or STOOK-HOLE.

A short Hole, bored in some Stone, not all together fast, but Chills, as in Shale-Binds, Thin-Beds, and such like, they being not Strong enough for Gunpowder, nor yet no Joynt to set in a Wedge; the Hole may be bored five, six, or seven Inches deep, according to the strength of the Stone, the Wedge may have a Sharp or Flatt end, but stronger, thicker, and longer, than the common Wedges; the Feathers or Leaves, are made flat to go into the Hole, and thicker at the Ends, that are put downwards, and the Wedge is driven between them.

CLIVES.

The Iron in which the Corfe hangs to be let down or drawn up; that part is flat wherein the Bulle rests, with a Lid to move upon a Revitt, which falls on two Shoulders of the other Side, above which a Spring is placed to hold it for opening, the upper-end has a Hole in it, and

bent

bent backwards half down, in which the Rope is put, and at the end of the Rope a Knot is made, and thereon the Clives rests.

COATING.

Nothing more then filling old and uselefs Gates up, with Deads or Stone, or any Rubage.

CÔE.

A small Cabin built over the Shaft, of Clods, Stone or Boards, to keep the Shaft dry, and Shelter the Miner from the Fury of the Weather.

COPE.

A Duty to be paid to the Lord of the Mine, by the Merchants and Ore-buyers, within the precincts of the Liberties, (or any that comes from without) to pay for every Load of Oar that they shall buy four-pence; this is Collected by the Barmafter. Furthermore, any Miner is said to have a Groove on Cope, when he takes the said Groove on Bargan, to get or raise the Ore, at a certain Price per Load, for some certain time; and these Miners go by the name of Copers.

CORFFE.

A kind of Box, used to carry and to draw what the Miner gets in his Mine, they are made of Sawn Boards, or else of cloven Ash; it consisteth of a Bottom an Inch thick, and 15 or 16 Inches long; the ends are of a Board the same thickness, and the same breadth with the Bottom; and in the Bottom near the ends of it are two Holes bored, in which the bended Bule

is put, and Wedged fast; on the outsidés of the Bule the ends are placed and nailed fast to it, as also to the Bottom, then Sides of half Inch Boards are Nailed on, their Depth is about 6 or 7 Inches, and they are made of all Sizes.

COULCH.

A Piece of Earth falling from the Roof or Side, in soft Works.

CRAMPS.

These are known by any Body, but their use is to keep Churn-Pumps fast on the Joynt, or Cramp them fast to Stemples; also to hold Raggs in their Places, and Trunks in a Shaft, or in the Roof of a Drift.

CRANCH.

A small Piece of Wholes in the Vein left uncut, for the Support of some Rider, Lid-stone, or Hanging Side; such Cranches are left though good Ore be in them; yet to avoid a greater Damage they are left, for a small Piece of Wholes will hold up a greater Weight than any Timber we can set to it, so will also Walls of Stone, where they may be conveniently made.

CROSS-VEIN.

This Explains it self, but we shall have some Remarks thereon, when we come to *Pee*.

CROSS and STAKE.

It is a good Possession for three Days in the *Low Peak*; That is a small Cross cut in the Ground with a Hammer, Spade, or Knife, &c.

and

and a small Peg stuck down in the Middle of it, and this small Trifling Business will secure a good Title, if a Mear of Ground be worth five Thousand Pounds, but then you must be sure to set on Possessions in the three Days time, or else it is free for any other Man. In the *High Peak*, the Cross and Stake holds Possession, but while a Man may go home and fetch his small Stoce's to set on it; and as many Mears as he has a mind to take, so many Crosses must be made straight along as you think your Vein Ranges, and at the Distance of 29 Yards, between every such Cross and Stake.

Cross-Bills, *See Bills.*

CROSS-CUTT.

This is a Term but lately Sprung up, and is the same that the old Miners formerly called a *Door*; and it is driving a Cross from one Vein to another, or cutting a Door through from one Vein to another, or from one Pipe to another, or to their Midfeathers; this is practiced where two or more lies near one another, and may be reached by cutting such a Door between them; these Cross-Cutts are sometimes Cutt at the Top of the Ouges, for the Discovery of the Vein.

CUSTOME.

The same with the Articles of the Mine, and are too long to be incerted under this Term at this time, and since the Customes of the *High* and *Low Peak* are in Print, and may be easily had, I omit it.

CUTTING-WORK.

Any such Work as will not be got loose, or wrought with small Tools or Hacks, but requires strong and weighty Picks or Mandrills to cut it; and this Stuff is any thing that the Ore lies mixed with, such as Chert, Callamy, hard Tufft, Sparr of many Kinds; hard Pipe Works, Sinking hard Shafts, hard Shale and Binds, and frequently the Lime it self, for it is not always that the Miners use Gunpowder to break the Rocks. In both *Peaks*, where there happens that they must Sink where it is Solid, that is all of one Piece without Joynt or Seam; 'tis all cut with Picks, and that by choice Workmen, which seldome concern themselves with any other sort of Work, and they are commonly called hard Workmen; these may be known by their Complexions, which is very Pale, caused as is supposed, by the continual Dust that arises from the Pick in cutting the Stone; some Men in some Places, blast all their Hardness, yet without doubt it is not so good away nor ready, if such Men may be had that can cut, and a Skillful Smith to make and sharpen their Picks for them.

DACKER of WIND.

When we begin to be far from the fresh Air, that is from the Place where it has a perfect current, whether it be by Shaft, and Shaft, or double Gates and Doors, Fangs or Trunks, and it is our Candle that first gives us Intelligence of it, which begins to burn dull, and to cast a weak Light, and without due care in working

ing, goes soon forth. The worst Seasons are in the Summer time, when the Air is Sultry and Hot, and Calm withall; the Lights at such times will hardly be kept in, in the common Gates. Warm and close Foggy Weather is bad, and the old Miners were wont to say, that when Pease was in Blossom, then was the worst time for Wind in the Mines of all the Year.

DAMP.

A light Substance generated or bred from Smoke or Thick, and bad Air, killing Men in a short time, and that without any sensible Pain, as all Miners say that has had the Misfortune to be tappish'd with it; and since this may seem Strange, it may be worth ones while to enquire a little into it, so far as our Experience has been informed about it. These Damps may be distinguished into two Kinds: First, such as are caused by Smoak; and the other, such as are bred in windless Places; for the first, I never knew any bred by Blast-Smoak; but when Fireing was much used, those Fires required a considerable time to burn in, as 3 or 4 Hours, which without a current of Wind, to throw it out constantly, will soon fill the whole Work; and this happens if the Wind fall or turn, some times another way, so that it is too weak; which Smoak if there be any Vacancies forwards, or more especially under the Passage of the Wind, as in Sumps or under Drifts; there is the Place where in all probability 'tis most like to settle it self, and more surer if there be any standing

Water

Water, there it may be found, if none be but the Sole of the Drift moistned by a drop falling there, it will be sure to gather and settle it self around it.

It is known to most Miners that Smoak under Ground will condense, and adhere to the Sides, (especially where Blasting is much used, and the Wind but weak to cast it out) more than one would expect, so that it will soon dim and put forth the Colour and Lustre of Ore it self; and if one draw their Finger along the Side, there will stick to it more than one would expect, of a black Substance that will Smell strong like the Smoke it self, and in such a place where Wind is scarce, and Blasting used; one may observe very little Smoke to come forth after a Shot is off, and yet it will clear after some time; and if one take a clean piece of white Paper, and lay it in some convenient Place for a Day or two, the Sediment of the Smoke may be found upon it plentifully; so that one may suppose the coldness of the Earth condenses it, and perhaps the Water may attract it, and add some pernicious cold Quality to it also.

Now the form that it lies in when it is condensed and settled in its Place, if it be upon Water, it lies on the Surface close and thick, like a Cloud of a white colour, or much like to Wool; if in a Drift where no Water stands, it gathers into a much lesser compass as like a Man's Hat Crown, or like a Foot-Ball, and by throwing any little thing upon it, it is disturbed and broken; and I do not know one Instance where
any

any Man has been so bold as to break it in any Drift, or Shaft, or Sump, that has escaped with his Life, if so be, he has gone down and broken it; but it is easy enough to be seen, unless one plunge upon it, not expecting it at unawares; the usual way is to throw down something upon it to break it, and then get away with all Speed.

The second sort of Damp, is that which is bred from bad Air, and is in all respects much like the other only this, which we call by the Name of a Ground-Damp, is the more pernicious and deadly, and not so visible as the other is, but the faint Light of the Candle, with a blue Circle invironing it, is all the Signs we know of it being there; this is caused by working too long and hard in Windless Works, and a Man will feel himself as if he was in a Stove, he Sweats hard with little Work, Breaths short, which causes in him the Head-Ach, with a Palpitation of the Heart; and in a Morning when he goes down, (tho' it has had all Night to clear in) it will have a Sharp or Keen Smell, resembling something of an Onion, this at length breeds to this Ground-Damp; I have known a Man Ride down a Shaft, and the Damp has been in it, he has broken it, (tho' unknown to him,) the Horse has been drawn up on purpose to let down another after him, he has gone but fallen from the Horse before he has been half way down, and this by the Damp in so short a time.

One would in such a case as this, wonder that no Skilful Naturalist, has in Charity to the Miners

ners, bestowed some Pains to prescribe some Preservative for the Miner to have along with him, when he begins to be in daily fear of it; but being in hopes, that this may come into some such able Hand one time or other, as may consider of it; I write the following Relations, Experienced in part by my self, and many times by other Miners within my Memory, so that if it may serve as a Foundation to build upon in such a case, I should be very glad; and I affirm it to be so near the Truth, that if the most curious durst try the Experiment for their own Satisfaction, they would agree with us; as to the manner of its seizure, and working, which is thus, viz.

All Miners both Antient and Modern give this Account, That they never feel any sensible Pain or Disorder in themselves, but after a most pleasant way, it takes the whole Use of all their Limbs, and they settle down, as a Man falling asleep. feeling nothing at all, but an extraordinary Sweet, and Lushious Taste and Smell, that beguiles and ravishes the Senses in a Moment.

This is the whole Account that we Miners can give of it; and this so far as the Memory continues, after being seized or tapished with it, and drawn up by the Heels for dead, yet have Recovered; but never could such Men Remember, or give any Account of the least Pain they ever felt in it. * And now give me leave to tell

* These Damps are not so common now a Days; first, because Fires are not now used, Gunpowder doing the Work more quickly and as effectually. And for Ground-Damps, the Miners are more careful now a Days to secure and take a good Air along with them, so that these Disasters are not so common. There are some prating Miners that say they can kill the Damp; but that is ridiculous, there being nothing to destroy it, but by the currency of fresh Air, as we know of.

tell you, the best Preservative we Miners know of, and verily think is of great Force against it, we have it delivered to us by the old Miners, and many I have known to confirm the same; but here are two Examples, the first I was not present at, being more than two Miles from where I than was; the other in our Liberty, and my Brother one of them, the former was thus: Two Miners Sinking a Shaft in hard Shale near 20 Yards deep, it happened the Ground-Damp bred in it; one of them went down, his Partner of a considerable time after hearing nothing of him, and knowing it was Windless, began to suspect the Matter, and forthwith calls his next Neighbours, and tells them what he fear'd; having now some Company, down he goes to see what the Matter was, and soon was damped likewise; and now more Company coming in, one young bold Man ventures down and has the same Fate; and after him (the Depth of the Shaft being so small) two more, and those damped likewise: This put the whole Company to a stand, and as they were considering to carry Wind down in Trunks, by chance a Tinker seeing a crowd of People, turns out of his way to see what was a doing there; having heard the Matter, he said it was no difficulty to fetch them up; (the Man had been Drinking all Night, he feared no Danger, nor could any persuasions stay him from his design) he throws by his Budget and pulls off his Coat, and down he goes, ties the dead Men in the Rope one by one by the Heels, and after climbs up himself, without any

Damage, only when he came up again into the fresh Air, he Vomited most violently, and was most deadly Sick; therefore it was concluded that the Fumes and Strength of the Ale preserv-
ed him, according to the old Miners Opinions.

The next Instance is of a * Fire-Damp, one bred by the Smoak of a Fire, set in the Work. The Takers over Night set a Fire, and give their Neighbours Notice thereof; next Morning both Parties go to Work, the Takers find their Work clear and in good order, but the Damp was bred in the Founders; five Men went down besides Labourers, the Damp was broken by letting down some Tools down a Sump in a Corse, and an old Miner experienced therein soon discerned it, and bid them all get away, but before they could reach the Shaft Foot, three of them fell down in the way, the old Man follows, and helps those that were able to tie themselves fast on the Horse; the three that were fallen in the Drift, he drags one by one, and ties them by the Heels in the Rope and sends them up, and last of all Rides up himself; this Man had been Drinking the Day before, and most part of the Night, so that it should seem not to Work so soon upon a Man well Steeped in Ale.

Many

* These Fire-Damps caused by Smoak, are more Gross and Thick when they are broken, than those we call Ground-Damps; yet both are so Thin and Rare, that they are nothing like the muddy Air, they are bred of a thin Substance, and may be discerned in a blue Circle about the Candle Flame; it will easily intoxicate a Man at the Day, by hanging his Head over the Shaft when it is sent forth by fresh Air,

Many Mens Lives have been saved after this Manner, which seems to be an Act of Providence, rather than any foresight, or care that a Man has of himself; and indeed I never yet knew nor heard of any Man that was Sober, durst be so bold to take a sufficient Dose of Ale on purpose that he might the better encounter it.

The way that is used to those who are far gone with it, or those who appear to be dead, is to Dig up a Clod in a green Place, and lay them along on their Bellys, with their Face in the Hole, where they lie not above four Minutes, but remove them into fresh Earth, and in three or four times so doing, some signes of Life will appear, if there be any left in the Body, and upon a little recovery they are deadly Sick, and Vomit strangely, with Heavings at the Heart a good while after.

As touching those Damps that are generated and bred in Coal-works, which are so easily Inflamed; I can give little Account of them, as having no Experience therein, nor are the Mines * Subject to them.

DAWLING.

That is when the Ore in the Vein or Pipe, &c. is decayed and grown worse, that is lesser in Quantity than usual, yet not quite dead.

* Only one I have known, it was a hard and sulphureous Work, and by a Candle it was set on Fire in a Roof, and made a Noise and blue Drops fell hissing down like Brimstone set on Fire; it endured 2 or 3 Days, the Men got all safe to Land without any harm.

DAY.

This is meant to the Sunshine to the Day Light, to the Top or to the Land ; as in saying we draw all to the Day ; we can hear from the Day ; it will run up to the Day, &c.

DEAD.

Where there is no Ore, and Deading in a Vein is a dead Place ; and Deads are the Gear, or Work got in such dead Places.

DEAF-ORE.

A certain whiteish hollow Stuff, and Mouldy withall, and very light ; yet some small Grains of Ore may be seen in it, it is found most commonly in Shods, and Tops of Veins, being a Sign that the Vein is not far from it.

DIG, DELVE, SUBVERT, and TURN UP.

In Customary Liberties, it is the Priviledge that the Miner has in any Mans Lands within the Bounds thereof, to Dig and make search for Ore, without asking any Man Leave ; and tho' it may seem hard, that a Miner should come into any Freeholder's Lands, and there Dig and Delve, where, and how he shall think fit, without making any Satisfaction ; yet it is so, for the Miner pays the Duty called *Lott*, for that purpose ; the Season of the Year is not considered, tho' it be Grass ready for cutting, Standing Corn is not excepted, yet the Miner will not abuse it, unless some necessity compel him ; and if he do cut some up, he will make full Satisfaction for the Damage ; but all Houses, Gardens, and Orchards, are free from the Miner, provided they

they are proved Antient Freehold Lands, otherwise not; and a Miner may make his way over any Man's Lands, Hedges or Ditches, &c. if he carry but his Hack and Spade with him, without any fear of being Sued for a Trespass at any Time.

DIPP.

Is when the Flat-beds lies not Levell, but declines some way, and it is by them that we know when the Rock Dipp, unless we be on the Top of it; Veins often follow the declination of the Rock; the natural Dipp of a Vein, is when it runs it self more down into the Rock, and consequently thickens its cover of Stone, the like of Pipes, &c. Drifts are said to Dipp that way that they descend.

DOG and BITCH.

Two pieces of Iron made, one to hold the Boring Rods fast, while it is Screwed with the other; the Bitch is that Iron that holds the Rods fast with their Weight, while they are Screwing or unscrewing.

Door, *See Cross-Cut.*

DOORSTEDS.

Four pieces of Timber, which when they are set in their due Place, are much like a Door-case; the Side-pieces are good strong Oak Timber according as need requires, and about four or five Foot in length, and these we call Doorsted-Forks; they have a Collar on the Top-end, in which the Head-tree resteth; and the Foot of the Forks; if the Wholes be too Soft,
that

that we think it will let the Forks settle when they come to be weighted, we put a Sill under them, with Stopes cut into it, and set the Edggs-ends of the Forks in them, and drive them fast up against the Head-tree, so far till the Nog-holes appear on the inside of the Forks, and therein put two Nogs of Wood, and these keep the Forks from being pressed inwards by the side Weight; the Distance between the Nogs, is the width of the Gate within the Timber, and that for a good Gate is reckoned three-quarters of a Yard; but however they are cut more or less according as it suits with the Nature of the Work.

DOTS, and DOT-HOLES.

Round holes of Ore, runing into the hard Stone, especially in Pipes, much like those called *Blanches*; but these Dots have very often some Softness in the middle of them as Clay, or some kind of Tuft or Spar, and many times they will break, or lead to good holes of Ore.

DRAWERS.

Those Men that Wind or Draw up whatsoever is got at the Shaft; also the Linnen Breeches that the Miner wears when he goes down to his Work.

DRIFT.

Any Way or Gate that the Miner cuts under Ground, whether in the Vein or no, be it hard or soft, close or wide, &c.

DUTY

DUTY.

That part of the Ore which of Right belongs to the Lord of the Mine, which is every thirteenth Dish, gathered by the Barmafter; in consideration of which, he defends the Miner in his Priviledges, and Antient Liberties, if any one oppose him therein.

ELBOW.

A place in a Vein or Pipe, &c. when the Side in diiving cuts off, and suddenly comes in again to its place, forming a Corner, or like a Man's Arm when it is bent; it is caused by two Joynts, the one leading part of the Vein aside, the other bringing it in such Elbows, sometimes are very good.

EYE.

Of the Shaft, it is the very beginning in the Surface or Grafs Clod, sometimes called the Mouth in old Works, where Shafts are run to the Day in great Pits, or where much purcasing has been about the Tops of them; they are very hard to be hit, and causes the Miner much trouble to shift them to make them fit for drawing; the Eye of Tools is the Oblong hole, that is made through them by the Smith, in which the Haum is fastned.

FACE.

When in driving in a Vein it alters from its Nature on a sudden, caused by some large Joynt, or by one Vein crossing another; so that my Forfield is clean cut off, and nothing but an even Face of Stone appears in its Place; in this case
may

may happen a Face of Ore, or a Face of Spar, Tufft, &c.

FADDOM.

It is the length of six Foot; in some Places the Miners cut all their Ground on Bargain by the Faddoms, in others by the Yards; as so much per Faddom, or so much per Yard.

FANGE.

A Place or Vacancy, which is left as we drive along the Drift on purpose to carry Wind along with us, as far as we go on in Scrins and streat Veins, the Fang is made under Foot, the Stick-
ing being slit, and convenient Stones choked over it, and joyned as close as may be, and the holes stoped up with Clay, and small Gravel tem'd upon it, and by treading and carrying upon it, it makes it hard and secure that it looses no Air, and may be continued a long way; in Soft and Timbred Works, it may be done with Boards upon the Sole of the Gate, if well contrived, and rightly placed, for a great way as before.

I know that in some Places, it is the way as soon as they begin to grow windless to clap in Trunks, but these never last long to do Service; Tin or Lead Pipes are much used, some blowing the Wind down, others with Bellows to Suck the muddy Air forth, and both ways have done very well in their Kind; but at best the Air is but bad, yet Men may make a hard Shift to do with it, but where a Fang may be conveniently made, there is no way like it, (only Double-gate excepted.)

In

In soft Works in Timber'd Gates the way that is used, is either to lay the Trunks on the Sole of the way, or to hang them by Cramps in one corner of the Roof, all along the Drift; for the first it may be good, if the Trunk be large enough and made strong withall, and the Gate of a sufficient height, that the room they take up in lying, may not too much lessen the Gate, and thereby hinder the Labourers in carrying; but in this Case the Trunks are often broken, by the Weight, and careless throwing of the Corves upon them; and indeed 'tis very rare to see good and large Trunks made for this purpose.

As to the other way of having the Trunks in the Roof of the Drift that never does well, except for some short space, as being often Jostled and disturbed by the Labourers in carrying, and therefore not much to be approved of; but to come to the best and safest Method, let us suppose a venture new and fresh begun on; it is very likely that the first impediment may be want of Wind, this being so common, that few are set upon where they resolve to spend some Money, but the Maintainers will sink two Shafts of equal Depth, and at the Soles have a Drift cut between them, and then there will be Air enough so far.

I would likewise have double Sumps again in Sinking further, but not double Gates in driving, but that Expence may be spared, and Air enough taken along by Fanging, let the Gate be never so long, dipping or rising; now the Reason for double Sumps is, because (as I said

before) Trunks are never made large enough to carry a sufficient Quantity of Air in proportion to a Fange. And again, Trunks made fizeable to carry Air to equal a good Fange, might perhaps be too large to hang within the Square Timber of our common Sumps, and so cause some hindrance in the Draught, and consequently break and disjoynt them, which often causes a great deal of Trouble, which a Sump prevents, and does the Business more Effectually.

Now some may Object and say, it is more Chargeable doing this way; but it is easy answered, if it be considered the Charge and time that it will undoubtedly gain in long Trials, where they do oft stand and come back to get Wind; and again if the Trial prove not so long, but answer our Expectation; then here may be a deal of Work done and Ore got, so that we may have some insight into the Nature of the Vein itself, before we need sink Shafts, or want Wind at all, and I have done it very successfully after this manner, viz. Having two Shafts stricken together (at what Depth soever,) makes a clear Passage for Air, then I set out to drive, and take a Gate five Foot high at least, but half a Foot more is better, and let it be three Quarters wide, whether it be timbred or not, hinders nothing at all; then to bring the Wind along, Stone must be lay'd on the Sole, on either side in the form of a Wall, and let the space between the two Walls be the widness of a Foot, or more if you see fit; and let the Walls be of such height as your Gate will well bear, lay some Sticke hew-

ed somewhat Flat on the Walls across, at about the Distance of half a Yard one from another; upon these along the Sole of the Drift, lay boards that are of Strength sufficient to abide carrying upon, and let them lie in Breadth between Fork and Fork; and if the Edges be plain'd so that the under Sides may Join close, and the upper open a Quarter of an Inch, it is the better, for thereby Gravel and Dirt will more readily get in and close the Joynt the better up, then let the out-sides be stoped up with Clay or such like; but those Boards must be fast Nailed down to the Bearers under them, and thus you have a large Fang and very little inferiour to a double Gate, * and may be continued to carry Wind (if due care be taken) as far as you please.

FARMER. §

The Person that ownes the Land where the Miner Props and makes search for Ore, (and not the Tenant) if he Trouble or Molest the Miner, the Lord of the Mine is bound to defend him;
H but

* This way, or Trunks well set on the Sole that are strong and large, will carry Wind as far as you please; and tho' it be cutting or frequent blasting Work, will throw out the Smoke in an Instant.

§ 1743, This very Year the Farmers have attempted to destroy the Priviledges and Customes of the Miners throughout the *High Peak*, by striving to set aside, and utterly abolish the Twenty-four who are the Body of the Mine; and some base and degenerate Miners for a little present Interest, were ready to give up their Rights and Priviledges, delivered to them by the care and Industry of their Forefathers, and ruined their Posterity, had not one particular Gentleman (being a good Miner and Maintainer in Mines) stood up to vindicate their good old Cause, and recover'd them from a total Destruction.

but if the Miner makes any careless waste of his Lands, by his Hillocks, Buddle-holes, Wash-places, &c. he may have Remedy.

FAT and SIVE.

The only and most useful things used, (Water excepted) in the Dressing and making the Ore Merchantable; the Miner was formerly wont to lead all his Boose, &c. from the Vein to the next convenient place where there was Water, and there Dress it, and had a way laid out by the Barmafter, which was often great Damage to the Farmer; upon complaint thereof, the Miner brought the Fat and Sive to the Mine.

FAUSTEDS.

The waste, or that lighter kind of Stuff that is seperated last from the Ore in the Sive by washing it; it is always a mixture of Stone, Spar or Tufts, &c. with the Ore, and goes under the Bucker, and then it yeilds good * Smitham; in some Places the Miners give it away to the Cavers.

FEATHERS.

One and sometimes two of these are used in Blasting with the Iron Plug, they are made and proportioned to the Plug, both in length and thickness; one of them is thin and exact, that it may be put down with the Hand so far as it must go, and if it reach two or three Inches into the Powder 'tis the better; the other Feather is made more strong, that it may abide driving without

* Which had always by Custom used to be Duty-free, but now otherwise.

without reaching the Cartridge. And 'tis this driving that was formerly the most dangerous Work that the Miner had, and it was least the Powder should Fire, which often happened, and was the Death of many a Man; but now the Plug and Feathers are laid aside, we have seldom any such Disasters.

F E I G H.

That which in washing the Ore lies uppermost in the Sieve at every serving, which the Washer Skims forth with the Limp to the Hillock, and the Cavers sit under the Fat, to pick any Pees of Ore that they can find in it, 'tis called Waste.

Fell, *See Boofs.*

F I R E I N G.

This is the most Antient way that was used to break down the hardest Rocks; and whether the Miner Learned it from *Hanabal*, or *Hanabal* from the Miner, let the Learned discuss. There is no Country with us, where it is used now a Days, so that very few Miners understand any thing of it; since the way of Blasting has been known, it has by Degrees decayed; yet in some particular Places if used, it goes far beyond it. At this Day in Scrin Works, their Gates appear to be very Streat, and many times 'tis very Difficult to bare them; nay, in some Places, I have known Men to Blast after the Old Man a considerable way before they could bare him. Fireing is thus: In Sinking we observe to take a good Length, as 7, 8, or 9 Foot long; it being so much the better in this Case, and the

Sticking

Sticking being either soft or hard, to slit it as far as may be, then the Fire is carefully placed on the Sole, and first Dry-wood is laid that is small, and will easily be inflamed, and as much within the Sticking as may be.

And here give me leave to answer an Objection that lies fair in the way ; before I proceed any further, and the Miners of these present times may do it as soon as any Body else, because I presume there is not many now a Days that is acquainted with it, so they will argue thus :

How can it be placed within the Sticking, for we suppose it to be Streat as an Inch, or may be less ; but admit it may be two, or an Hands breadth, &c. and the Top of your Side flat and even, so that you have small Advantage to begin on ; and in this case, your Sticking can hold but little of your Fire, and for that Reason must do less Good.

All this is allow'd, but then you must consider, that Fireing has an Affinity with Blasting ; and as it is common to set leading Shots, so it is to lay leading Fires ; but then it requires some Skill, that it may be prudently done, that one may make room for the better setting of another ; all Fires make the most room where there is the greatest Degree of Heat, and that is varied and applyed according to the Judgment of the Setter, and the further it goes the thinner is the Stone that it gets, till at last it end in thin Shells, except some Joynt alter the property of it.

And now I will describe the way used in managing this good and Antient way of Workmanship ;

ship ; and first the chief thing is, to take care to bring as good a Wind along with us, and always as near the Fire as possible we can ; and this is done by some Fang most commonly, and always so continued, that the Air may strike under it, or at least against it, and so burn the better, and carry off the Smoke more cleverly ; this care taken, the Fire is first built of dry Wood that is small and will be inflamed by a Candle on that we put larger ; and lastly, such like as Cord-wood, and when such Wood is scarce, we mix it with Coal or Horse Bones, which is very good for the purpose, and makes a very hot and fierce Fire, and having laid on what we think is sufficient we Fire it, * and leave it till next Morning, and then it will be for the most Part burn'd out, and the Stones some fallen, and others are cracked and riven, that they will easily be got ; sometimes when the Fire endureth long the work will be very hot, and then if one have the conveniency of some Water to throw upon it will cool it, and the Stone will crack with a Report much like Pistols shot off, and fly off much more effectually, and better than without it ; but one has not the Water always ready.

But here may arise a Question, How the Miner should get down the Stone in all places, as now is done by Blasting ? Why, well enough, if he be Skilful therein, on the Sole we have shewed already ; in a Forfield we use to chocke
Stones

* It is often seen the Ore will be Melted to Lead, if the Stone be but Solid, and without too large Joynts.

Stones between the Sides, as we see it may be suitable to the Place to bear up, and support the Fire that it fall not down from its Place before it has fully done its Business; in a Roof we always make a Bunding at a fit Distance from the Roof, and cover it with Stones very safely, and make the Fire thereon; and in Roofs the Fire work very Effectually: Now where Grooves are so wet that a Fire cannot burn, the old Miners had no Remedy but let it alone, for as yet Blasting was unknown to them; it is the easiest Work (saving the Heat thereof) that belongs to Mining, for all a Miner can do, is to break up his Fire, slit his Sticking, and lay another in one Day, and that must burn in Mineral Time; (which I shall speak of hereafter) but this must be noted, that Chert, Spar, &c. or Stone mixt therewith, never Fires well.

FIERY DRAKE.

Or rather by Miners, the *Burning Drake*; it is a Meteor much talked of to be a sure Sign of much Ore in the Place where the fall; as to the Truth of it I can say little, nor did I ever see any of them fall in the Night; I well Remember some Years ago in *August*, on a hot and Sunshine Day coming from Work, about two or three o'clock in the Afternoon, I heard a sudden Noise over my Head audible enough, and going with a swift Hush, being Startled, I turned myself towards the left Hand, when suddenly on my right, I had sight of a large fiery Meteor, which pitched downwards to the Ground;

what

what the exact Form was, I had not time enough to observe; but the end downwards seemed much lesser than the upper end, for that was more bulkey and broad, and the Motion of it was with very great Swiftnes; now it may be expected what I have observed to happen near the Place, in Relation to the Discovery of a Lead-Mine? Nothing at all, for it is a Place where never yet any Trial was made since that time, but whole and untouched for some Distance from it round about.

FLAT, or FLOT.

It is neither Vein, Pipe, Rake, nor Scrin, but a Place that hath both Length, Breadth, and Thickness, but all uncertain, till we are very well acquainted with them; some of these Flots carry good Ore where never Vein was yet Discovered, tho' such are very rare; the other most commonly lies on the Top of the Lime, and are in some Places very Good; these tye to the Vein, and run a great way with it; the Dip of the Flot Discovers the Side that the Vein lies on, which proves mostly the Hading Side of the Vein; and 'tis observ'd by the Old Miners, that the Flat always lies on that Side of the Vein which Faces the Water; this answers in *Wales*, where the Mountains lie Bordering near the Sea for the most Part; and it holds good in all inland Countries that do afford Veins, with respect to the Rivers; in Customary Liberties, the Miners Measure these Flots by Quarter-Cord, and the same Possessions are used, as in Veins, Pipes, &c.

FLANGE.

A Place where a Vein takes a run out of Course into one, and sometimes both Sides, in-
fomuch that the Ore lies more Scattered, and out
of its natural Order, and sometimes difficult to
find the right setting of the Vein again.

FLEAKS.

Those very useful things that the Miner uses
to make for Shilter, when he has as yet no C^ole
to hold off the Wind and Rain from his Shaft;
and also of great Use to the Budlers, Scrapers,
and Washers, whose only Defence it is against
the Storms and Wind; they are made of Boards,
or of Sticks radled together, and Thatched with
Heath, Ling, Fearn, or Turfe, or any such
Stuff that Cattle will not pull in Pieces.

Flooring, *See Bed-joynt.*

FOREBREST, FORFIELD, or FOREHEAD.

Those are all the same, but the most Antient
Name amongst the Old Miners is *Forfield*; and
it is always that Quantity of Wholes which he
takes in his compass before him, as he cuts his
way be it more or less.

FOOT-ALE.

An old Custom amongst Miners, when a
Man enters first into Work, to pay his first
Days Wages for Ale, and the rest joyn some-
thing thereto, which occasions oftentimes a Ho-
lyday of their own making, (as we call it) and
this is accounted to relish the better.

FORCE

FORCE.

A kind of Pump often used in the Mines, that throws the Water a good height, as four or five Fathoms, Men stand at the Foot of it to strike it; 'tis now worn out of Use.

FORKE.

These are of three sorts; first, such as are used in Square Timber; secondly, such as are used in Doorsteds; and lastly, Spurforks; of which *See* their proper Places.

FOUDENHED.

A small Pick, and the least of all the Tools that belongs to a Miner which he Works with; it is proportioned according to his Sticking, which we must suppose to be soft and streat, for the Tool sometimes not above half a Pound Weight, or a two-penny Pick, and so thin and slender, that it will not abide to have an Eye struck in it as some other small Tools commonly will; but is made by laping over in form of a Noose, without any Head at all.

FORESTOP.

When Work is very soft that it will not stand up, the Sinking or Driving of a Pair, then we use to Forestop, with Polings driven down with care to hold up the loose Sides, till such time as Room be made for Timber to clap in a Pair; the Polings are put in at the Top of the Pair last set, and driven so down, that the Points going a little outwards from the true Compass, may be wide enough at the Place where you design to set your next Pair, so that it may be put in with-

out disturbing the Forestoping, which is easy done, if the Polings be long enough, and driven down far enough in Sinking; the like is to be observed in driving, or in both, the side Weight will soon force all down, and this kept sure, it is easy to bring the Points of the Polings to their true Places, when the Timber is set.

FOUNDER.

The first Shaft or Place that the Vein is discovered in, and from this the Miner possesses, and lays out his Ground; and he has this Priviledge, viz. To have under his first Possession or Stoce, two Mears of Ground, and the rest both ways go under the Name of Takers, (except the Lord's Mear; but sometimes it happens that there is two Founders in the same Vein, for a Vein may be found at a Distance from my Founder where I have not possessed as being satisfied, and this is Lawful and good according to Custom; this Miner may possess his Ground towards me till our Stoces meet, and in time it may prove all one and the same Vein; each has his own Ground, but the elder Founder is served first, so far as his length extends then the other comes up to him; but with this Exception, that all odd Yards of Ground under half a Mear intervening between them, is the Lords, and we call it a *Primgap*.

But these Founders, with all the care a Man can use, are sometimes subject to Disputes and Differences; as in this last Case, where let us suppose the two aforesaid, honestly in Possession of each 10 or 12 Mears of Ground, now their comes another Miner, and will make Search amongst

my

my Possessions, or at least very near them; in this Case I bring the Barmafter, and two of the Twenty-four and throw them off, yet he may place them on again if he says he denys my Vein, and that he Searches for some other Vein as I set for a Cross, which I think comes hereabout, or the Forfield of such a one that points this way; alledging thus, he may go on 'till time makes more Discovery, although he light of my Vein and get Ore in it; and hence arises Contentions and Quarels, Inquires, Courts of Trials, &c. with abundance of villanous Tricks that the Lawyers will invent. But this is to be noted, that if the Person that makes this Trespas on me, has but the Sense before I Arrest his Work, (for which he has time enough) for if I Arrest, it must come to a Trial in nine Days, and no two Works can be proved one and the same Vein, 'till they be cut together, and if I fail to make a Hole, (for my Adversary will never help me so to do) I am Cast; but as I said, if he has the Sense to take away his Possessions, and be gone from off my Ground with them, I have no Remedy but take it as I find it, and no help from any Law whatever, as we know of.

FRAME.

This is for Sinking in Sand and Water, which is very Troublesome to do without it; the Square is made with only Slots and Tenners, in both Forks and Sliders, without minding Length at the Slider ends for Hold; sometimes it is made of four good Planks, so Joyned together, and in Breadth about half a Yard; such a Frame plac-
ed

ed in the Top of a Sand, may be let down with ease enough as one Sinks, for the Water always Dreans down to the Bottom, and leaves the upper edge of the Frame dry, and all above it; so that with a little care, it may be let down as we think fit, to make a Space for a Pair of Timber to be set to secure it; driving in Sand is very nice Work when mixt with Water, this may best be done by Fore polling with half Inch Boards made fit for the purpose, for the Water will come in at the Sole, and so let the rest Dry; but care must be taken that the Roof be kept secure, and for the rest, it may be done with due care.

FREEING a MEAR.

If I Discover a Vein, I give the first Dish of Ore I get or that I Measure, at least to the Lord of the Mine, or else my Mine is Forfeit for default; the like for all the other Mears as I cut into them; or for any Cross, or out-breaks, &c. especially if I suspect it will prove any thing that may differ from my Vein; and if it prove not, yet it makes me safe from all Danger which might otherwise happen to me by my neglecting it. In old Veins and Rakes, we free the Mear that we Work in; the Barmafter always Demands for what we free, we tell him whether for old or for new, or for both together, but then we give two Dishes, and this is noted down in his Book, to which we apply our selves when any Differences happens concerning any such things as he enters therein.

FREEING

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FREEING of ORE, STONE, &c.

This is nothing more than making one Side of it open, by cutting out what may be so cut or gotten, where it is the most soft and easy to be done; and when this is effectually done, it makes it to be more readily got, whether it be by Maul and Wedges, or Cleaving Holes, or by Blasting itself; and this is a sure Rule, you can never free it too much, where is no Danger of any Rock or Stone falling on you.

FODDER.

Amongst Lead-Merchants it is nine Pieces or Piggs of Lead, and commonly more Weight than a Ton by half a Hundred; in both the *Peaks* the Merchants deal and sell the Lead by Fodders.

GADDS.

They are Tools of excellent Use and Service, in cutting of any Hardness whatever * they are made after the form of Wedges, but are longer and more stronge, and they are very well Steel'd and Tempered, with a Hole made through the middle of them, in which we put a small Rod about half a Yard long to hold it by, while another Strikes upon the Head of it with a Mall, and so cuts the Hardness by Stopes after that Fashion. A Miner that is used to Work with these Gads, will cut the hardest of Rocks, and as much, or more in a solid Piece of Stone, than
either

* In ways cut with Gads, they must be more roomey than other Gates commonly are, or there will not be Room to Work in.

G A

either by Blasting or with Picks; and they are very good Tools to cut strong and hard Ore with.

G A G.

A flight bit of Timber that is soon made for the present purpose, to clap in sometimes when no better is near at Hand, to keep some one Pair or more from settling, which is already begun, and so to stay it for some little time, 'till better may be had.

G A B L O C K.

What this is I have told you before in *Blasting*; but yet we are seldom without one in the Works, which is straight and about a Yard long, and of very good Use to wrest a Stone, or a Spark of Ore that is large, as occasion may happen.

G A N K.

A Soil lying in some Veins of a very Red or Yellow colour, sometimes Branching and Spreading itself in small Strings or Joynts to the Rachill, * by which Signs it is very probable a Vein may be discovered; some Veins are naturally much inclined to it, such we call Gankey-Veins.

G E A R.

A general Name for all *Deads*, when cut out of the Wholes; some use to call it by the Name of *Work*.

G I N G E

* And if the Rachill prove something loose, the Joynts will be Stain'd much by it, and under the Rachill, (or Sidewide) where it is the most Gankey, the chief Leader may be found, which will be wider and regular.

GING up a SHAFT.

Where the Oagues lye not far of from the Day; in old Shafts, the Miner by ordinary Timber and Stoprice, or sometimes by Walls from the Top of the Oagues, makes a wary and frugal Shift to support it.

Grip, *See Twitch.*

GRACE of GOD, &c.

This is a very old Term and still used by the Miners in both *Peaks*, and elsewhere; I suppose the meaning thereof may be much better than it is expressed, for when he sets on at a venture for Discovery, if any one chance to come by, and ask of him what he Sets there for? his reply will be, I set for the Grace of God, and what I can find.

GROOVE.

The Mine or Work that a Man is employ'd in, hence it is, if a Question be asked, where is *Tom.* to Day? He is gone to the Groove, he is at the Groove; sometimes it is used for the Shaft, and Miners are commonly called *Groovers*.

GUDGEONS.

The two Irons that are put into each end of the Turntree, and run in the Slots of the Stoblades, at the ends on the out-sides of the Stoblade is a Noose or Loope made, and sometimes they are made with two Ears, to which the Shaft or Sweap is fastned to draw by.

GUN of WOOD.

The same with a hollow Plug.

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GHURR

GHURR.

This is called by those Learned Men that pretend to understand the Nature of it, the Mother of Mettles, * but for my own part I am not at all acquainted with it; I have asked many old Miners oftentimes, what Substance it is, what Colour, or what it most Resembles, but could never yet receive any Satisfaction about it, some never heard of it; others have heard the Name but could not tell what it was; others have thought that they knew it, but these were never able to shew me the least bit of it; so that as to the whole we Miners seem to be Ignorant of it, when some Men that perhaps were never down in a Mine in all their Days, are the best acquainted with it. But I lately light of a Miner, who thinks it to be that sort of Stuff which seems to be Dry, but being layed in the
Palm

* Or that Matter or Substance which in time Ripens, and becomes real Ore itself, and that it seems Greasy and very soft and fine, and of various Colours, specifying the Nature of the several Ores and their Differences, such as Glance, Steel, white when they are grown to Perfection; this I have related by a good Miner and Maintainer of Mines, but do look on it rather as a Notion formed, than experimently proved, for I think it to be strange that I never saw any of it in all my Time, but I have seen Ore that has seemed to be decayed, and has had round it sometimes Spar or Tuft, or other kind of Stuff, but we have always thought it to be decaying, having almost lost its Lustre; but afterall *Glauber* tells us that in *Germany* the Miners know when the Ores are not grown to Perfection, and usually say they are come too soon, and shut up the Mine again for some Years, 'till it is ripened and grown to Perfection. If any Miner would be so kind to shew me some of the natural *Thurr*, I should be very Thankful for it.

Palm of ones Hand, by gently touching it will become moist, as if it were mixed with Water, or rather the moisture contained in it by so doing, is drawn forth to the outside thereof, but break it and it appears dryer within, but this I take to be not worth taking Notice of; for then all Buddle Holes and Places where Fatts are emptied into, would be Thurr, and the Dust of the Ore itself, as may be seen at hard Works, because they will produce the same Effects, if used after the same manner; Spar resembles Ore the most of any thing by its Grain, it wants Weight for white Ore, and Colour and Weight for the blue.

HACK.

A Tool much used in the Mines, where it is soft Work to cut it with; it has an Eye made in the middle of it, into which the Haum is put and fastened with Wedges of hard Wood, and Kyles of Iron, it is well Steeleed on both Ends and Tempered; the one end is a square sharp Point, the other is made sharp and flat; the Hack is not made straight but bending a little on either end from the Eye, upon that side the Haum is put in on, yet not too much into the Shins.

HADEING.

There are not many Veins that will sink down with its Sides perpendicular to any great Depth, so that when one is thrown either way awry, the side on which the Plim Line will fall, is called the Hadeing-side; and according to the Hadeing of this, the other flies off, and that we

call the Hanging-side; in sinking or driving, if it be hard, and Blasting must be used, &c. we always find the Hanging-side more easy to be gotten than the Hadeing, * and therefore always used by us

HANDLE-PEG.

The Handle of Wood that is put into the Sweap to draw by.

HANG-BENCH.

A part of a pair of Stoce, and is that flat piece of Wood that reaches from the one Sole-tree to the other, and by two Holes in the ends of it, it is Pined fast down to them, at the same Distance or Length, that the Turntree or Spindle are of.

Hanging-side, *See Hading.*

HEADTREE.

That piece of Timber which is laid a-croſs the Gate in the Rooſe in ſetting Doorſteds, it reſteth upon the Forks in the Collers thereof; in each end of it are two Nogholes, in which is put two Nogs of Wood to keep the Forks aſſunder, when they ſhall be preſſed with lateral or ſide Weight. Hook the ſame, as Sweap or Shaft.

Hoppit, *See Brazen-Diſh.*

HORSE.

A ſtrong thick piece of Wood, with a Hole bored in the middle of it, and 'tis about a Foot long, and it is faſtned to the end of the riding Rope, the Rope being put thro' the Hole and

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* It being more ſubject to Joynts of all ſorts.

a secure Knot made on the under side thereof; the Miner places between his Legs and sits on it, and so rides down and up the Shafts that cannot be climbed by reason of their wideness, and Water too which often happens.

HORSEHEAD.

A large kind of Trunk standing on the Top of the Rest, the next to it being made so wide that the end of this may go into it, it is made broad and wide in the Top, and open on one side, and conveniently made to catch the Wind; it stands about two Yards high from the Shaft Top, and sometimes more; by this the Wind is forced down the Trunks the better.

HUTTRILL.

Any hard Pannel in a Vein or Pipe, that is more stiffer than ordinary, bound up and cross'd by mixt Stuff, as Chirts, hard Tufts, Caukes or Kevills, forcing the Miner either to sink, rise, or turn aside to avoid it.

JAGGERS.

This includes both the Men and Horses, that are employ'd to carry the Ore on the Horses Backs, from the Mine to the Place where it is Smelted, yet we say seperately Jagger-Lads, and Jagging-Horses.

JAUM.

A Joynt of Clay running a-cross a Vein or slantwise, making some alteration in the side by loose Stones, or in the Vein for better or worse, according as the Vein likes or dislikes them.
These

These Jaums are sometimes found in the Top of the Lime and funk down in, feldome prove any Vein, yet sometimes in some Places, are breathings through the Lids from Pipes.

IDLEPEG.

Upon the Stoblade which the Winder stands to draw at, there is a Hole bored through, just below the Spindle ; in this Hole is put a peg of Wood with a Head upon it and put into the Hole and Cottorel'd at the small End, that it cannot come forth, and made of a convenient length as to be easily drawn forth at Pleasure ; this is to hold the Sweap fast at any time that it turn not, and saves the Drawer the Trouble of holding it with his Hand, when occasion serves, and more especially in Sinking Shafts.

Inquest, *See Court.*

JOYNT.

They are of several forts, and is aparting in the Rock, Rider, Ore, or any other Substance in the Mines, their various kinds are Distinguish'd by their several Names, and do mostly explain themselves as thus :

End	Joynt		Sparry	Joynt
Flat			Kaukey	
Bed			Clay	
Slip			Gankey	
Dry			Rider	
Cross			Back	

None of these need explaining, except Slip and Rider-joynt ; and Slip-joynt is one that comes

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comes Slanting in before the Miner as he Cuts forward or Sinks ; Rider-joynt runs along as the Vein, and varies according as the Rider grows thicker or thinner ; the rest are plain.

JUMBLE.

When the Vein is confusedly mixt with Rocks, Clay and Tumblers, so that the natural Property thereof is altered, and that for the worse ; Veins are sometimes cut off by them, or lost after so dark a Manner, that it proves very difficult to Recover them again. It is found by Experience, that sometimes these Jumbles will throw them to one Side ; and if the Jumble be large, the interspace is so likewise, before it will set again ; sometimes they are not so much cast aside, as diped down by them, and in such case it requires an Experienced Miner to be the daily worker of it.

KAUK.

A very heavy Substance, and common in the Mines ; there are some Veins that are full of it and mixed with the Soil, as common as the Ore is itself, and lies as Regular in Ribbs, but they are generally more thinner, it is of Colour brown and more white within when broken, by Reason of its weight ; it has been thought to hold Lead or some other Mettle, but upon several Trials made, nothing as yet has been discover'd ; it is so ponderous, that it is some Difficulty to seperate it from the Ore itself.

KECKLE.

KECKLE-MECKLE.

The poorest kind of Mines that yeilds Ore, and the Ore is of the poorest sort, whether it be in Spar, Cauk, Kevels, Tuffts, or in whatever else it is run or mixt with; this Keckle-Meckle Stuff, has the Ore run with it in small Strings and Races, or spotted with it much like Birds Eyes. This, to make it vendible, is first knocked with a Hammer, and the dead Stuff picked out as clean as may be; then it goes under the Bucker, and is crushed as small as it may require, and washed; it yields only Smitham, but not very good after all the Pains bestowed on it.

KEVELL.

Kevells are of many Colours, but the most common is brown, or like a burn'd Brick; some of these are heavy, and some Veins are very full of them; they are seldom any Friend to the Ore at last, tho' may accompany it some time; and here it may be observed, that all great Veins have their Strings, or lesser Veins running parallel with them on the one side or the other; and if the mean Vein be given to Kevells, the others will be so likewise; and I have seen these Strings to be very full of them, and lying so loose, that with a Stick long enough, one might potter them down out of the Roof, to the height of two or three Yards in a Sticking about a Foot wide, and they would be as black on the out sides, as if Smoak had long passed amongst them, and red within when broken, and withall so crossfild together, and of such odd and different

ent Shapes, and so Sound withal, that some very sensible Men, but unacquainted with Mining, have upon Sight of them thought fit to affirm, that they were something that had been burn'd in the Fire,

KIBBLE.

A kind of Bucket used at the Mines, especially at the Engine Shafts and others, that are large to draw the Gear or Work in.

KICKER.

A Branch or small Piece of Wholes, left for the support of some Rider or lage Stone, or else some Lid.

Knocking Bucker, *See Bucker.*

KNOCKBARK.

All that is carried to the Knock-Stone, and there knocked down with the Bucker.

KNOCKER.

This is something which I have heard Miners talk much of, but I think the old ones have more than now a Days they do; and how to give a right Account of it I know not, but by hear say, and these Knockers have been thought to be a Sign of much Ore.

I have heard some Miners say that it is a Knocking they hear, Striking much like as when one in Boreing, not constanly but resting by Fits, and always seem to be at a Distance from him; I have thought that the falling of some drop of Water in some Shallow, might by falling be mistaken by the Miner for this Knoc-

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ker ; but then this would be Constant, which they say this Knocker is not ; but what the event has been of such Knockings I know not, but only as I have had it related to me ; some say that they have heard them in their Work, which have proved long and tedious Trials, and for that Reason they have followed on the longer, and spent a great deal of Money, but at last has been forced to give over ; and on the other Hand, others have said they have heard them some time before they have Discovered the Ore, and their Work has proved very well afterwards, so that whether there be any such thing or not, remains very doubtful ; and for my Part I cannot affirm, or deny any thing about them, as having had no Experience thereof at all, but that there are some kind of living Creatures in the Earth, and that they are heard by Miners sometimes, after one way or other I think is very sure, and if one durst take some Miners Words in so nice a Case seen too ; and here I will tell you a very remarkable Instance or two, wherein there could be no fallacious Delusion at all ; I once Worked in a Groove not many Years ago, where two more Men wrought, they worked by Yards at a deeper Level than I wrought at, and often came to their Work in the Winter time before Day in a Morning, and then was at Work before I came ; one Day I having some leasure at Work, it struck into my Head to go down to them, and to see their Work, for they had wrought there before I came to Work at that Place, and I had
never

never seen it ; but coming there I found no Body, which I did much Wonder at, since I well knew that no Body else wrought within my hearing. Next Day I told the Men how I was mistaken ; see you there says one of them to the other, it is what we are used to hear ; after some little Discourse, they told me that they had heard it very often, and (says they) not long ago before you came here, we was both at Work and heard a Noise, and we concluded it could be nothing but somebody coming down the Shaft, and in a little while, about the space they might be got to our first Sump-head, we presently heard as we thought, them throwing the Corves down the Sump ; we heard 'em rattle so plain against the hard Sides, and amazed at such a folly we came in haft up, where we found all things as we had left them when we came down without the least alteration, as we could discern. Thus the Men.

One Instance more may be of the same kind, where I have been acquainted, and 'tis this : I with others wrought in a certain Work about eighty Yards deep, the Shaft was Sunk in a great and loose Shack of Chirts, which sunk down to the Soles and much further for any thing we know, being exceeding loose, and not any openess seen throughout the whole Work, but the ways that were cut ; the looseness of this Work was all the care to keep it up ; yet what I Remark is, that the Workmen themselves, but more especially the Labourers, at the Sump-heads and in the Gates, have been often affrighted

ted with such a Noise and dismal Rattle, as if sometimes the Shaft had run in, and at other times the Gates or Sumps; I have heard it myself, and have thought by the Noise, we had been all made fast, but by God's Blessing, never found one Stick of Timber disordered or out of its Place; one would think that the Noise might be caused by something running in some openness, or great Shack, but there was never any such seen in the whole Work; for altho' there were large and wild shaken Places, yet they were all full of loose small Chirts to the Day; and this I have observ'd of them, that the further they were sunk into they grew lesser in compass, taking a great deal of Water; * what these Noises are, we Miners know not, but must leave them to the Disquisition of such learn'd Men as deal in those profound Matters; I mention it because Miners say that the Kncoker is some Being, that Inhabits in the Concaves and Hollows of the Earth; and that it is thus kind to some Men of suitable Tempers, and directs them to the Ore by such its knocking, &c.

K Y L E S.

Those small Bits of Iron made to drive into the Eye of any Tool, after the hardwood Wedges are driven in as far as may be; without
two

* I have formerly heard old People say, that those Creatures they call Fairies, were much more frequent than now a Days they are, but are supposed to be frighted or driven away by the Noise of the Miner's Blasting under Ground, to Places more Remote.

two of these at least, the Tools will not stay fast on the Head long ; we have two other Kyles which we call Joynt-Kyles, made large like Heaters, but thinner at the top End ; which when a Joint of Clay is too wide for common Wedges, we clap those in with the thick Ends foremost, and drive the Wedge between them, which is a very good way in such a Case, to force the Stone or Ore, or what ever else it is, that Requires these sort of Instruments.

L A S K.

A Word used in drawing Shafts, Sumps, &c. for Spare Rope, or not enough ; as Lask, the Drawer understands he must let down more Rope ; and no Lask, is that the Rope is too short to hang on the Corse with Toolles, Timber, or what else is to be let down.

L E A P.

This is a Term well known in Mining, but the Antient Miners better understood the Nature of it, than now a Days they do in many Places ; and it is when the Vein is thrown of from its perpendicular Course, at once into the Side ; these Leaps never happen, but at some Way-board, or large Bed-joynt, * and they make some Remarkable Alteration in the Vein ; sometimes a Vein in such Places, will Leap
much

* *Note*, That under the Way-board or Bed-joynt, where the Vein Leaps off, there will be always a hard Sole or Harstone, which will be a sure Guide to take along with you, this when you come at the Vein will never Dip to forme a Side, but the Vein will Cut it clear off, and so Sink down.

much aside as a Yard, two or three, or more, and it seldome leaves any Sign of it self in the Way-board, 'till such time as it sets down again; and in some hard and lesser sort of Veins, it may be observed, that the Bed-joynts themselves will often carry it a little aside, according to the Dip of them.

LEATH.

In hard Works it is any Joynt, or softness that gives some Liberty and Advantage, for the better freeing the harder Part, in order to Cut or Blast it.

LENCH.

These happen in Shafts or Sumps, and may happen by the Vein taking some small Leap, or by some Rider in Sinking that Chops in at some Bed-joynt, or leaves of at the same, and the hard Side come into its Place; in which Cases the best, or softest part of the Vein flies more to one Hand, and there stands jutting out a part of the Side within the Shaft, Sump or Gate, being sometimes more, or sometimes less; this we call a Lench, and we set such Timber as the Place may Require to Nail Boards thereto, that the Corves may the better have Passage up or down.

LEPPEY.

'Tis when Work is Soft, Kind, and Winable enough, without any Hardship, as Boreing, Cuting, Blasting, or such like.

Level, *See Sough.*

LEVEL

LEVEL WATER.

That Water that rises from the Soles in Mines, and not any other that falls downward; this Level Water always lies about the common Level of the lowest Grounds, or rather the Rivers, and in a dry Season it will fall considerably under them, but in the Winter is much about their Level, and though it be drawn or Pumped out, yet it will always rise again to its own Level, and is always bottom Springs.

This Level Water is always Troublesome, be the Spring more or less, nor can we ever hope to let it off by hoping to find any Shack, Swallow, or such like, for if any such be discovered, they will be always full of Water, and likely to Discover more Springs or Water Courses, and the more Work and Ground we Cut, must always expect the Water to increase; this Level Water can never be let off but by Soughs, or Levels Cut up on purpose; there is no drawing this Water to the Day by Tubs, Buckets or such like; it is a common Way of working, to drive on at the top of this Level Water, and Cut the Vein out for many Mears in length, whereby is made great room to hold back Water, (as we call it) then with some Pump we throw the Water over some Stalch, that will hold the back Water off, or make a secure Dam for the purpose, then Sink down setting Pumps one under another to lift forth the Water; if there be a large Spring at the first entrance into the Level Water, such a Place will take much more Dead Water, than where the Spring is less, altho'

altho' the lefs be much more weighted therewith, and therefore the more fit to be chosen to throw Dead Water into.

L I D D.

The cover that lies over the tops of Veins sometimes, but over Pipes always; and though we may in some Parts of this Work seem to assert that Veins are not Lidded, yet this may be noted that they may be so, but more especially on their Dip, where it seldom fails of strong Beds, Shale, or Chirts, when on the rising part the same Veins may be discovered to the Day for a great length together; Pipes never fail of Lids, it is that by which they are distinguished from Flats; yet sometimes in the most rising part they are found to pipe up to, or very near to the Day, and sometimes out at the Day and so end.

L I D S and T R I E S.

Sometimes they are taken for ordinary kind of Doorsteds; sometimes for a single Headtree, with one Fork clapt up in the middle of it just for present Use, to support for a while some Weight, until some better Timber can be put in, as in soft Forfields, where the Roof is forestoped, and by the Weight the Polings points are in Danger to be pressed downwards, and at such a time these are very useful.

L I M E.

The same with Lime-Stone-Side, or Lime-Side, or Lime-Rock; the Limits or Boundaries of the Vein that formes the two Sides as it
runs

runs along, and not that space or breadth that the Vein takes up, that is its wideness between the Sides, which we suppose to be Lime-Sides, such being the most common; yet it is seen that Shale, Chirts, Greet, &c. do produce very good Veins, and that last very well likewise.

L I M P.

A very small and thin Piece of Board, shaped almost half round, and it is Shod on the circular Edge with Iron very nicely; this the Washers use for to throw off the Feigh from the Ore out of the Sive, at every putting in when they Wash; and also seperate all Deads from the Washt Ore, and make it fit for the Merchant.

Lissum, *See Bed-joynt.*

LOAD of ORE.

In Customary Liberties where Ore is never weigh'd, it is the number of nine Dishes, and there it is sold at so much per Load, if the Merchant and Miner can agree, yet not to leave you in the Dark, we will venture to explain it, and that after this manner:

The Brazen Dish is, and upon the Sizeing it once a Year, as the Body of the Mine constantly does; exactly eight Quarts filled with Water, this in the *Low-Peak*; but in the *High-Peak*, we always reckon and esteeme it to be one eighth Part bigger, and this is well known to the Ore-buyers, who if the Ore be of equal goodness, will give one eighth more in the Price than in the *Low-Peak*; and as touching how many

M

Loads

L O

Loads may go to make a Ton, if so be, the Ore be good, as one Dish to weigh five Stone and one half, and that any Body will allow, then it will follow, that three Loads five Dishes, will be full enough to make up one Ton Weight.

LOBBS.

These are Subterranean Stairs, for when we drive Dipping downwards, we go by Stairs or Lobbs, so as the dipping requires, and do make them convenient with Timber, that thereby the Labourers may have better Footing, both for themselves and the Corves, that they may carry the better, and the more readier.

LORD.

He that is the chief Proprietor and Lord of the Mine; to whom Lot or Farm is paid by the Miner for his Liberty to Dig, Delve, Subvert, and turn up, in any Man's Land within the Liberties.

LORDS-MEAR.

One Mear of Ground that always belongs to the Lord of the Mine, and it happens thus: The Founder is always allowed to have two Mears under his first Stake, or Possession, either way one, and the Stake in the middle; after the Miner has driven to the end of these two Mears, tho' it be but a single Gate, then the Lord comes in for his Mear, and may choose, at which end he likes best, or if he pleases he may take at each end half a Mear; this being done, the Miner most commonly buys it of him, if it be not set at too great a Price, which in this Case is
feldome

feldome wanting ; otherwise the Lord fells it to whom he thinks fit, or Works it himself, * which oft proves a great Hinderance to the Miner in his Work, for which Reasons the Miner is willing to give more than realy it is worth.

LOT.

This is the Lords due for protecting the Miner in his Priviledges, and is every fourteenth Dish, in which all the Smitham and Fausted Ore was to be Free, and indeed all the small Ore that pass through their Riddle ; but this is for the most part lost now a Days, through the Covitiouness of some Miners, whose unfair Dealings in knocking down part of their Round Ore to avoid paying the Duty they ought, has brought it to the State it now is in ; so that in some Places Duty is Paid for all, in others it is not so strictly look'd to.

LOUGH.

A self openness, very common in hard Pipeworks, they break by following some Blanch of Ore or Spar ; some of them prove bigger, some less, and all within will be lined or garlanded round with Ore, Growing out on Knobs and Bulches, curiously Cut and Diced, and of fundry Colours, which is very Remarkable and Pleasant to behold ; and see what various Shapes Nature has cast it into ; some of these Loughs are dead, but curled and adorned after the same

M 2

manner

* The Lord cannot Command the Miners Shaft for to draw up his Gear at, but must agree with him on Terms, or Sink a Shaft in his own Mear to Work his Ground out.

manner by Spar but hask and dry, and of no pleasant Colour at all, being mostly of a yellow mixt with black; these Loughs are very common in Ore, whether it be in Rib, or in Lumps, and then these Loughs are oftentimes fill'd with Water, which some Men say, has some extraordinary and secret Virtue.

LUMB of CLAY.

A Gulph of Clay that sets down into some hard Rock, and of a great length and breadth, and also of a great Depth; Veins never prove well that run through them, except it happen that they lie to the Lime-side, and if the Vein lies any thing towards the Lime, it will be sure to incline to it; but if the Randome of it Cut the Lumb of Clay at a Distance from the Side, the Vein will appear sometimes as a small Seat or Leading, with some of those Symptoms in it, tho' but small, which do naturally attend it, such as small Spars, Cauks, Chirts or Soil; there is often at the beginning and end of such Lumbs, * good holes of Ore both soft and rich; these Lumbs are mostly without wet, yet it is seen where they are large, that they are often subject to some Sandy Joynts, which run through them standing like a Stickin, that do afford Water.

LUMB

* Those Lumbs of Clay will sometimes cut off the Vein, tho' it be large and full of Ore, as a piece of Timber Sawn in sunder; it is to little purpose to try for the Recovery of the Vein by Sinking in these Lumbs, but by Driving in them on the Point the Vein runs to find a Side or Face of the Lime before you, and then Drive on either Hand by the Lime Side to discover it.

LUMB for WATER.

When Shafts are sunk down and troubled with Water, we Sink two or three Yards deeper than the Design of the Shaft, on purpose to hold Water one Night at least, so that is drawn out in Buckets or Barrels once or twice in a Day, to keep it that it run not over to annoy the Work; and this we call a Lumb. In Sumps the same Method is used, Teeming and Drawing it from Lumb to Lumb, in large Engine Shafts; the Lumbs are made Sizeable, and in Proportion thereunto.

LYING SIDE.

The same with Hading Side.

MALLAN.

This is of divers Colours, as white, dun, brown, and always Soft; it is a kind of Tuft, lying much softer than Tuft it self, Ore lying in it, is as Bullets and naked Lumps, more than any other forme, and rare to be seen after the manner of a Rib; hence we say, Mallany, Gear, or Stuff, when the Vein inclines to that kind.

MAULL.

The biggest Iron Hamer for breaking Stones driving Wedges, &c.

MANDREL.

A Tool made after the manner of a Hack, but more Strong and Square, haveing both ends Sharp, Square Points, and Steeleed very well; this Tool is used for cutting of Hard-work, which Hacks are unfit for.

MARGASITA

MARGASITA.

By this we Miners understand nothing else but Brasil.

MATCH.

These are of two kinds, which we use in Blasting, the one is the Powder Match, made of a small bit of Paper, into which a little Gunpowder is put, and 'tis about three Inches long; pritty fast winded up to keep the Powder in its Place that it shake not out, then we pull of one end of it, and Place that End in the Priming at the Holc top, and make it secure in its Place with Clay, and under it a Crois we Place the Candle Match we set it on Fire; the Candle Match is made of a Piece of a Candle Week, or more commonly of a small bit of Paper that is Dry, and twinded, up indifferently hard, and well Greased with Candle-Grease.

MEAR of GROUND.

In Customary Liberties, it is the length of Twenty-nine Yards, and this kept in Possession by placing the small Stoice at the End of it, and always Measuring the Ground from them straight forwards, only Founders are otherwise; in the *Welch* Mountains the *Peak* Miners coming there called the Mear thirty Yards, and so it continues still.

MEAR-STAKE.

A large Stake driven down into the Ground, in the middle of a Crois, sometimes at every Mears end, and sometimes only at the beginning and end of the whole Mears, the better and
quicker

quicker to find their Boundaries ; in private Liberties this is used.

MEASURES.

The natural make of the Earth, so far as we discover it in Mining, as how far one may Sink from the Day before he comes to an alteration, as from common Earth, the first into Clay, from Clay to Bibles, from Bibles to Shale, &c. and be able to give an Account of their several Thicknesses, and also of any hard Measures, Binds and Levels, that afford Water, all of which are of good use in the Mines ; * but then I presume so far, that we have no certain Rule to know such things (let some Men say what they will) but by Experience only.

MIDFEATHER.

There is very seldome any Pipes that are of any compass or Value ; but there are more running parallell with it at a Distance, and it is natural for these to be attended with what we call Midfeathers, and these are a small kind of Pipe running in the space betwixt these others, sometimes it breaks by Places into the others, by some Joynt that gives it way, † and by the like Joynt is again led out ; these Midfeathers are always

* This is a Singular and Excellent thing to be known, where Veins or Pipes have a strong and thick Cover over them, and of very good Use in Sinking Shafts ; a Man may nearly know where he is, and what he may expect.

† Or led together by the Skirts, these are sometimes useful for to drive Doors, or Cross-cuts into others that lies convenient for Air, &c.

ways very uncertain for that Reason, but when they conjoyne with the other, they make the Worke much kinder and better.

Miners, *See Groove.*

M I N E S.

The Bufiness which we are now Discourfing about through the whole Treatife.

M I N E R Y.

The right understanding of Mines, * the beft and moft proper ways that are to be taken for carrying on the whole Work, both for convenience and Proffit, which without fome prudence and foresight, cannot fo well be done; and as the chief Point, it is good for a Man to venture upon a fafe Bottom, be it either in Customary Liberties or upon Leafes, fo that all Wranglings, and perverfe Law Suits may be avoided, whenever your Work comes to Perfection, which I know is very hard to do in fome Places; if this hinder not, it may be the better looked after for the reft, for if Ore be once difcovered, and it lie Ebb and Soft, you may Sink Shafts thereon as you please, without any great Danger of miffing it; but if it lies Deep and remote, hard and much Hading, then Shafts are more coftly, and therefore deserves fome timely Confideration left you Repent too late and fit down with lofs; nothing will ferve fome Men, but when they have made Difcovery of a Vein, tho' not fure of a Work, but take a Point of the

* For the Difcovery of Mines, See the *Appendix.*

the Randone of the Rake, and fall to Sinking Shafts, thinking readily to come at it ; but alas ! how many Baulks and Obstructions there oftentimes happens by the way, is well enough known ; and this runs them to greater Expence than they expected, besides much time is spent about it, and yet at last so driven off, that it answers not at all the conveniency they thought off. And to divert my honest Reader, I will tell him a Story of a Manager I Remember not long ago :

He was sent from *London*, and intrusted by a Company to venture for Lead Ore, and being Flush of Money, got into some Shares here and there, in the Fagg ends of a certain Lordship, and a Shaft was to be Sunk, and meeting at the Place his Partner and their Miners, gave their Opinions thereof ; but this *London* bred Miner rejected them all, and would take his own way ; he Sunk and fell on the Hadeing Side, without the least Sign of his Vein ; and being told how he had mist it, I value not that (says he) I do conceit that the Ore is there, and through I will go, the harder it is the better I like it, for this hardness is an Infallible Sign, that vast and strong Ore is lodged under it, for which Reason there he Sunk, and might have done so still, had he not tired himself, or rather his Masters I think ; the same Person during the time of his Sinking in this Place, thought his Workmen got too little Stone with their Shots ; and being told by one of them it was Solid, that is says he, all of

one Piece; he casts his Geometrical Eye upon him, and says I need no Emphasis, I know what Solidity is, or I have studied the Mathematicks to small purpose I am sure. But hear me what I say, and I will Demonstrate to you a way to break up the Stone with Gunpowder, that you are not acquainted with, get (says he) an Auger that will make a Hole three Inches Diameter, and bore a Hole Perpendicular in the very Center at the bottom of the Shaft, about a Yard or four Foot deep; give it Gunpowder enough and make it fast, and I'll warrant it break the Stone up from the very Bottom.

Any Miner may know this to be a wonderous Person, a Demonstrative Miner bred in *London*, sent into the Country to enrich a Company, and he had certainly done it, had Mineing been agreeable to the profound Notions he had of it; but the contrary happened so Sensibly and Plain, that it needed no Demonstration, especially to the Constituters of this Oblique, and irregular mineral Diagram.

But I must resume my former Discourse, which was touching the Sinking of Shafts too precipitantly, without some Considerations of what ill Consequences may be likely for to ensue, and give some general Advice how to avoid such Hindrances, either wholly or in part; to do which, after the Practice of the old Miners, which I take to be very good, was thus:

When they had Discovered a Vein, the first thing they did was to Sink down into it, so far as they thought fit, to try the Nature and
 Proofs

Prooffe of it; and they then thought that the moſt neceſſary Work was to drive a Gate at the Vein-head, ſo far as poſſible they could, and warely to Obſerve all apparent Alterations therein; as to its puting up higher, or dipping lower; and what might be the cauſe thereof, as whether it proceeded from a chop up of the Vein it ſelf, or be occaſioned by ſome ſlip or croſs Joynt, ſome Lough or Shake, and more eſpecially if it ſo happen, that it afford any Water, and this is a very good Sign that a Shaft may be there Sunk at leaſt with more eaſe than where it is hard and dry in the Roof; I know that ſome Men are always for Sinking as near their Forfield as they can, yet will not by any means Sink before it; and this I hold to be reaſonable enough, provided that there be none of the beforementioned Signs appearing; but do not much approve of the way that ſome other Men take, when they ſet their Shafts a number of Yards further than their Forefield is driven, and the reaſon is, I have ſeen ſo many Diſappointments in the way, as well in Expences, as loſs of Time; and this may be taken Notice of, that a few Yards in ſuch Places at the laſt, is either hindered by being Windleſs, or by Water, or both, ſo that ſometimes they are even loſt. In theſe caſes it is good to have it Dialed by ſome truſty and Experienced Perſon, and then it cannot be much amiſs, that is not the Shafts breadth, and for knocking one to another, it often times deceives, and not much to be truſted too. And here before I leave this Diſcourſe

let me leave this Remark, because I have observed it. That where Veins and Pipes are strongly covered with hardness, it very seldom happens but that the Miner before he has driven his Forefield as far as (by all his helps) possibly he can, he may observe such sort of Signs as aforesaid, one I mean at least; but then he will answer that it does not suit with his convenience to sink there, be it so, but this I must tell him, that I do believe God and nature has design'd such Places for the benefit of Man, provided he would lay hold of them, and not so saucely reject them; and if this fell out not altogether so pat for his Purpose, he knows not but the next may; and any Miner will allow, that at the Top of the Lime there are Chuns and Leadings, and have been followed, and lead into the Work at last; tho' by the way in Sinking, often been Twiched very close, yet not clean gone out; and what should hinder but they may be discernable on the under side in one Place or another, if carefully observed, and what advantage would accrew thereby; I leave it to any Rational Man to Judge.

MINERAL TIME.

It is eight Hours Space, and included between eight in the Morning, and four in the Afternoon, and this time is exactly to be Observed in some Cafes, for during this time a Man should make no Fires in his Work, for fear of doing his Neighbour any Damage by the Smoak, where their Grounds are cut together, and the Air has a free
 Passage

Passage between them ; also Purchasers are all to go away from the Works when that time is expired ; and Miners working on Wages by the Day, are obliged to Work that time for a Days Work.

Some have said that Miner ought to possess his Ground in that time, but that is not so for he may possess his Ground at any time as I have seen ; others say that it is not lawfully done, if before Sunrising or after Sunsetting ; this has been done, but I never knew any contest about it ; and one may reasonably suppose, that if two or more Partners make any such Discovery, they will keep that Secret, 'till they have secured it, and are at Liberty to take their own time as they shall think fit ; and a Miner that Works for himself, may Work Night and Day if he pleases, without any Man or Custom forbidding him ; but yet there is one case touching which I have known Courts of Trials held, and the Plaintiff has succeeded, and Takers or Possessors have been cast and quite thrown out ; and that is when Men on Wages have been proved to possess Ground within the Mineral time, that they ought to have worked for their Wages, and their Master or Masters have carried the Cause ; so likewise if a Miner cut a Stick in a Mans Land and make Possessions of it, the Work has proved well, the Owner of the Land has Sued in the Mineral Court, and proved his Right to the Timber, which the Possessions were made of, and thrown him out of the Work.

MOCK-ORE

MOCK-ORE.

A kind of hard Stuff but not heavy, it shines at a Distance like Ore, insomuch that some Men not well acquainted with Ore, have taken it for Ore it self, where there has been Quantities of it; where it is found amongst Ore it sticks very close to it, and it is hard to get it of; it is most commonly found in hard Veins and Pipes, some do call it *Black-Jack*.

MOULDINGS.

The Ore that is found on the Tops of Veins, especially near to the Day, is of so Mouldy a Colour and so very Small, that one may crumble it with ones Fingers; it is as if it were decay'd, and we Miners think it is so, by lying so near the Day, and suppose that the Sun, Air, and Rain may impare it; * these are found in the very Corn-mould, in Mole-hills, and always attends the Tops of Veins or their Shods.

NITTINGS.

That Ore that stays in the Seive in washing of Smitham, which is something rounder than the Smitham it self, and is taken up out of the hinder end of the Seive, with the Limp in washing, and the washer always keep a Lay of this over the Bottom of the Seive, which does the better in washing Smitham.

NOGHOLE.

The Hole that is bored in the Slider or Head-tree, where the Nog is put.

Nog

* More of it may be seen in the *Appendix* following.

Nog.

The Piece of Wood that we put into the Nog-hole to keep the Forks in their Places, it ought to be made of good and sound Wood, for they very often break by side Weight; one Inch is enough for it to stand out of the Noghole against the Side of the Coller; in lining of Shafts or Gates, where Fork will not be driven up to their former wideness, we make use of Iron-Nogs to drive into the Slider or Head-tree, to stay them in their Places.

NOGER.

That Instrument of Iron that we use to bore Holes in the Stone with; the Bit is Steel'd, made Sharp and well Tempered, (I told you their Shape in the Word *Bits*) their bigness is about an Inch at least, for either Blast-holes or Clift-holes; their length is from one Foot to three as we think fit, and we are stored with enough of them of all sorts, according as the Work for hardness requires them; the shortest Nogers we call the leading Bits, and always use them at the beginning of the Hole, [and also for the more conveniency sometimes of striking the better, always taking care the longer Nogers be made with a Bit something less then the leading Nogers, that they may easily follow them; some Miners have Steel on the Heads of the Nogers, which doubtless saves them very much, others like it not, as thinking it wears away the Hammer too much; but where boring is much used, it is less loss to wear more Hammers and less Nogers.

NOOSPEN.

NOOSPEN.

Putting the Clevefs under the Corff Bule, and then clafping them over the Top to the Rope, and then the Corff hangs by the Bule in the Noofe; this is fent up to the Drawer, to give him Notice that the Shift is over; this is when he Counts not, (when they draw by Task) but fome of them below, and when the Count is refered to him he does the fame, that they may fend up their Blunt Tools and come up.

OLDMAN.

This is Gear that has been ftir'd or cut before by fomebody, which can never happen but in old Works, or in old Venturcs or Trials; and when the old Man is cleared out from a Shaft-foot, Forfield, Stool, or Stope, we fay we have bared it, viz. that Shaft, Forefield, Sole, &c. This is very difficult to Sink, or Drive in where it is a great widenefs; fometimes Wholes is found to be very loofe much like Oldman, as in Shacks and other foft places; and crufted Wholes fometimes may be mistaken for Oldman, but that is never long before the Truth is Difcovered.

ORE.

This is the mean and only thing that we Miners and Maintainers do feek after, ufing all the ways and means we know or can think of to difcover it; and becaufe it has been for many Years fo gainfull and profitable a Commodity, it has caufed more Miners, and Venturers by far than formerly were wont to be.

Lead

Lead Ore we distinguish into three kinds, which we Miners observe, the first is Potters Ore, which is the same with that we call Glance Ore; the second is Steel Ore, and the last is that called White Ore, and I will shew their Difference by giving a Description of each, as near as I can, and first Potters Ore, the best of it is soft and tender and easy broken, and in breaking falls much in square Pieces, and if broken the right way there will appear in it a large broad and flakey Grain, which very much resembles the Shape of a Feather, and it is of a lively, fresh and azure Colour, and more especially if it lies in Clay; and they say that this is the easiest Melted, and affords the most Lead. The next is Steel Ore, which is more hard, and has its Name from the Resemblance the Grain of it bears to Steel when its broken; and there is some of this sort of Ore that breaks with a Grain as fine as the finest Steel when broken, so that it is nothing like the Potters-Ore but in weight, and yet I suppose not equal to it neither; its colour is more White, and indeed it looks more Aged, as being bred for the most Part in hard Chirts, and sometimes in Shale, and these never produce Ore of so youthful and Florid a Colour as the Clay does; the next is the White-Ore, as appears by its Name, or it is rather of a more dun, or brown Colour, but not so ponderous as either of the others are, neither do we ever find any great Quantities of it, but rather it lies in Lumps or Bits here and there scattered in the Vein; as if it were attend-

ing on the large or greater Ore, and seldome found far from the blue Ore, and may be looked on as a Sign thereof; of all these Ores we Miners like Potters Ore the best, because it is the most pleasant and clean, and believe it yeilds most Lead, and fits the Potters purpose, who will give a good Price for it, but the other they will not meddle with; but then they say that the Steel Ore yeild Silver, and I have made enquirey of an able Man well Skilled in those Things, who tells me as follows, viz.

I have made many Trials of these kind of Ores, and so I know by Experience; and for that called Potter's Ore, the best thereof holdeth very little Silver, so little, that it is not worth while to Refine it, but then it yeilds as much Lead as can be expected, besides it is so frim and fusible that a great deal of this sort is Sold, and carried over Sea into *Holland*, at a very good and advantageous Price, where they say they make use of it about Earthen-Ware; now for the Steel Ore by Reason of the hardness of it, it is not fit for this Use, nor will it Melt so freely in the Furnaces without a greater Heat, and much more Pains, and Quick-Lime and Spar are thrown in amongst it to make it run the better, and some has been of so hard and stuborn a Nature, that old Iron has been formerly used to mixe with it to bring it off, but after all it does not yeild Lead like the other, but then perhaps this is the best and richest for Silver.

The White Ore is next, and this is fusible enough, but will not yeild Lead as the others
will

will do, and we think there is no Silver in it at all, nor is there any Quantity thereof to be found together, to make any Effay worth our taking Notice of. Thus *J. W.*

There is no other kind of Ore found in the Lead Mines that we know of, though in some Places there may be a small Tincture appear of Copper, but nothing worth; and Brassil, a ponderous shining Substance, we do not know, that it is of any Value to hold any Metal at all; and Cauks the heaviest kind of them, that so much Resembles White Ore, and by Reason of its Weight very difficult to be seperated from the small Ore in washing, has been thought to have some Metal in it, but upon many Trials made, has never yet been found to yeild any. But before I part, let me leave this Remark, That Ore is the most principle thing in forming a Vein, Pipe, Scrin, Flat, &c. and if found but by one side, makes the Veins pass more Current; Ore is the very Vein itself, all other Signs of Ore or Vein, are not comparable to it; yet this is allow'd that two Sides and Soil between them, formes a dead Vein, but then there is this difference, the one is quick, and the other dead, that is the one yeilds Ore, the other none at all.

Overstem, *See Noospen.*

OUGES.

The solid, hard, and firm Rock, or rather the Strong and Sound Lime-Sides, which bounds the Vein, excluding all Riders, Claunchers, Cheestones, Tumblers, or any other Parcel

thereof, that is seperated from them, by any Crack, Joynt, or Haum whatsoever,

PAIR.

We use three sorts of Timber that are called Pairs; the first is Square Pairs used in Sinking, which we will shew in its proper Place; the second, Doorsted Pairs, these we have already spoken of; the third, Treetree Pairs, which will follow hereafter.

PANNELL.

A small Piece of Wholes that is left uncut, either to support some Weight from falling, or else it is left, because it is more hard than Ordinary, or dead, and not worth the cutting.

PAWN.

When there ariseth any controversy in the Mines, after the Complainant has Arrested, in three Days time he puts in his Pawn, which in the *High-Peak* is Nineteen Shillings and Fourpence; in the *Low-Peak* it is Six Shillings & Eightpence, the Defendant does the same, if he design to stand Trial; these Pawns rest in the Barmaister's Hand, and are designed and applyed towards the Charges of the Jurymen's Dinners; but however, the party that gains the Verdict, may demand his Pawn again, according to Custome, and have it restored, which he always does; only to preserve his Priviledge, yet Treats the Jurymen commonly with it in Ale, or other Liquors.

PEES of ORE.

The chief Sign of a Vein, when in the Soil we strike, or hit on the smallest Bits of Ore with the Bit or Point of the Hack, that it appears blue, the Stroak Discovers them, and not the Eye; sometimes we include in these Pees Bits like Walnuts, small Beans, and all that are lesser, if they but Smut with the Hack Bits.

P. and T. or TYE.

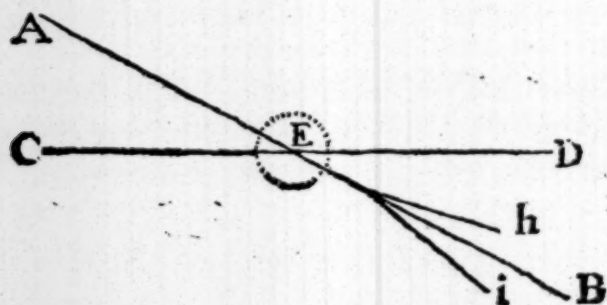
The Pee is the Angle, or point where two Veins cross each other, in which, in Customary Places we do observe this, viz.

That if one Miner have a right to this Vein, which we will suppose to Range *East* and *West*, and another has a Right to a Vein which crosses it, and makes the Pee; he that comes to the Pee first takes it, and is allow'd so much out of the Vein he has so cross'd, as he can slit out both ways with his Tools, be the Haums long or short, provided he come not with his Shoulders within the Cheeks of the others Vein, which if he does, it will be found a Trespass.

In Veins that are soft and large, but more especially in broad and wide Pipes, which lie all in softness that cross one another, making acute Angles; much Difference often ariseth, because the Cheeks, or Setting off, or Skirt, is often very hard to find; and it so happens that where two Mines are at strife, both Parties make all the haste they can to get the Advantage of being foremost; he that comes first to the Pee, will take it, be he the older or younger, and he will
make

make the other a way out if possible he can, otherwise if he cannot then it is called a Tye, and the Vein, &c. that can best set forth, and prove his Antiquity is to go away with it at this Tye; but here oft ariseth great difference between Parties in this case, for in large Works, it may require some time to make the Truth thereof to appear; and in the Works some deceit is oft used to preserve and keep a good Work rather than loose it, which is not worth while to mention; but that some honest Maintainers may know how sometimes such Subterranean Matters are managed by some bad Men, we will Demonstrate it thus:

If two Veins or Pipes cross one another Right, or Obliquely as I draw this Figure.



Let A. B. be the Antient Vein, and in Possession F. and Partners, let C. D. represent one younger, or of later Discovery, and G. the Possessor of it, and Works his Ground a-pace from C. his Founder towards D. but in the mean time cuts F. his Vein, A. B. at the point E. they prove both rich and wide at the meeting, as the pricked Line at E, denotes; now F. follows
hard

hard on, and strikes through to G. in the point E. and that before G. has made out the Veins, or either of them over E. towards D. or B. and here a contest arises between them; F. calls the Bar-master, to Summons in the Major part of the Twenty-four, draws up a Bill of Complaint, with Instructions how they are to view the Work, and going down at A. they find F. serviceable to E. so likewise G. to E. but upon the two meeting together, they make a wide Place, and no Sides at present to be seen, as E. the prickd Line represents, for which Reason these Men can give no Answer to the Complainant, but charge G. to follow his Work effectually, under Pain of a weighty Penalty for 12 or 24 Hours, according as they in their Judgments shall think fit, in order for the Discovery of a Cheek; and in the end of that time, the Major part returns again to view it. Now in this Interim lies the nicety, as first, if G. cannot discover the set of his Work in driving one half Mear, then it is a Tye, and he yeilds it up to F. according to Custome; but if he does, and can make F. away forth, then all things are well, but then E. must take care that he take a fair Vein or Pipe along with him; and that it so appear in the Sole and Roofe, or Skirt; but in such a Case I have known ill Men make an Artificial Vein, &c. to blind the Twenty-four, as the Line h. or i. and this they have done, by beating in proper Soil with a Mall, and mixing it with some Ore, that it might appear to the beholders more perfect for several Yards together; and

and because the Twenty-four must not handle a Tool in these Cases, but View only; 'tis possible they may be deceived by such ways, but on the least Suspicion of Fraud, they will force them to open it; and this is a way that of late Days, has been Practiced by both Parties, when they have had the opportunities for so doing, and may be extended to other Cases as well as this.

PICKS.

These are of several sorts, first Pole-Picks, they are for hard Work, and have but one end made Sharp, the other is a Head-end, to break or bruse a hard Burr, or Lump of Chert, or any hard Substance we meet with; the Head-end is about four Inches long, the better to Ballance the Pick-end, and these are very good Tools for cutting the hardest Stone if well made, well Steel'd, and well Tempered, with an Experienced Miner to use them; the next sort is Sticking-Picks, these are made for flitting great Stickings of Cauch, Spar, or Tufts, that lie mixt with the Ore; Pillow-Picks, are yet a Size lesser than these, as supposing the Sticking to be somewhat Streater; the last is a Foulden-Head, this is the very smallest that is used by Miners, and is without a Head, and a Lath that is Stronge will make it a Haum good enough; this is for Street Joynts, but then they must be Soft where this is used; it is scarce one Pound Weight at any time.

Pipes, *See Trunks and Tinpipes.*

PIPE-WORKS.

PIPE-WORKS.

Although Veins be the general Names for Places, where all Metalic Bodies lies, yet amongst us Miners, we distinguish them by fundry Names one from another, as Veins, Pipes, Scrinns, and Flats, which may be seen in their proper Places; and in this Case a Pipe always lies Flat, or is a Flat Work, having in the general a hard Roof and Sole, both the height and width of it is often uncertain; however, that which bounds and limits its breadth, we never call Sides, but the Skirts, or Scurts; this is a general Rule, all Pipes break at some Wayboard, which lies in the Roof of them, next to the hard Lid, and the Body of the Pipe lies under it, and always rises at the Scurts.

It is very Difficult to lay down any Rule for the breadth of Pipes, they being so various till Experience has proved them; but as I have seen them in their several kinds, I shall give an Account of them; Pipes breaking at large and soft Wayboards, are mostly very great ones, both in height and width, and vastly rich, and the more so if they have a strong and good Cover; these large Pipes have one or more running their Course along by one Side of them, and very often on the North Side, and such are found upon the rising Side, and may be of a great width, but then they are but low in respect of the other; yet we find that their hight always increases on the Diping Side, and the contrary, such as these I have seen to be 30, 40, 50 Yards wide, and sometimes much more by Spots, and

P
such

such are always soft Works, delating or contracting themselves according as they find or not find suitable Softness to spread themselves in.

It is often seen that the great Master Pipes will seem to take a rise, by Piping up into the Lids a great height, and as often they will plunge down on the Sole, tho' at the same time the Body of the Pipe may continue its Course straight along, so that these Ups and Downs as we call them, are oft very Rich, yet at last they end in hardness, and are but as luxuriant Branches, growing from the Body of the Pipe.

In these sort of strong and soft Pipes, they are never without scarcely thick Covers or Lids, which are not without either some Clay, Chuns, or open Shack-Joynts, (if search be made to find them at the Top of the Lids) which are breathings from the Body of the Pipe; and these are the proper Places for Sinking down Shafts, for the rarely Fail to lead down into some Part of the Pipe; in these Pipes they have their Ore the most Regular, and true next to the Sole Stone which lies flat, (contrary to a Vein) and is the most stronge, and this we call the Sole Cake; sometimes other Cakes may lie above it, but not so stronge, nor of that thickness, and more above it lies in massie Lumps and Pieces, making up the Body of the Pipe; and lastly, on the Top that is next to the hard Lid, lies a Clay both Fat and Fertil for the Production of Ore; *

* Miners do not use to trace things any further than what seems to be very probable and the most Skillful; think Clay to be the Original of Thurr, and Thurr, be (tho' so hard to be known or found by Miners) the Mother of Mettles, as some write that perhaps never saw it.

this Clay may be mixt sometimes with some Stones that are settled down from the Lids or otherwise, but if the Lids are found and firm, it is commonly Hoverin'd.

Sometimes Pipes are very hard Work, that is the Ore is fast in hard Tufts, Chirts and Stone, crossfil'd or mixt together, and a large width withall, breaking into Loughs, mixt with Spar and Ore, Troughing down on the Sole by turns, but more often breaking into Loughs in the Roof, which are many times kind and good; nor are these sort of hard Pipes without some other at least runing by the Side of them, and Skirting together in some Places, and where they are at the greatest Distances one from another, not without their Midfeather; such as these are enduring Works, by reason of their hardness, and takes a great deal of Trouble and Pain, to break the Knockings, and crush them to Knockbark, to make the Ore Merchantable; this being small Ore, had wont to be Duty-free; but now thro' the Covetousness of the Lords or other Persons, who has of late times formed the Duties, the Miner pays Duty for all, as not thinking himself able to contend with so great Persons, which is a plain breach of the Miners Ancient Priviledge.

There is yet one other sort of Pipes, that are very small in Compass but bear Ore; these sort the Miners call Dog-pipes, and in regard of Pipes, may be reckoned as Scrins are in respect of Veins. And some Works there are, that are of so mixt a Nature, that they fall not under the Denomi-

nation of eith Pipe or Vein, but by turns are sometimes the one, and sometimes the other.

PLUG.

An Iron Instrument used in Blasting, and made of such length as the Miner thinks fit, and according as he finds he can slit his Stickin; and it is certain that a Plug with two Feathers (when such were in use) was better for Riveing the Stone in Veins, than those Plugs used with one Feather; admit a Plug to be nine Inches long, the But-end is made round, and a little Flated on both Sides, and so grows thinner all the way up to the Top-end, and 'tis round made on the Edges; upon one of which Edges, the Riggot is made for the Priming of it, and on the flat Sides are the two Feathers driven down; the Plug is always made so much lesser than the Hole, that it may go down when it is wrapt up in the Cartridge; the other sort of Plugs are made for one Feather, with the Riggot on the opposite Side to that on which the Leaf is driven; these Plugs were used most by old Miners, in Pipes to blow off Lumps and Bulches, as being more Subject so to do than the other Plugs with two Feathers; some Miners has had them made with a hole Drilled down the Middle of them to Prime by, as being accounted a more safe way from Fiering, in driving the Leaves, Plug and Feathers made of good hard Wood, I have seen do good Execution, and a thin Splent of a Clip put down between the Plug and the driving Leaf, makes it the more fast; but since these are now of little

or no use, and a little Cauk, Sparr, &c. do much better supply their Places, this may suffice to shew how they have been used, before a surer way was found out.

POLLINGS.

These are cloven out of the best of the Timber, after the manner of Laths, but then they are much broader and stronger, and about three Quarters of a Yard long in general; but the Miner sometimes Cuts and Cleaves them off shorter or longer Lengths, as his purpose Requires; * their use is to hold up the Earth, between the Square Pairs, whether it be Wholes or Oldman, in Sinking Shafts or Sumps; or if the Work require but Three-trees or Stemples in Sinking, the like in any soft Driving, to secure the Panes betwixt the Doorsteds, both in the Sides and Roof, and that we may use no more of them than is necessary, we put in stoping on the back of them, commonly Turfspade-clods, placing the Grass Side thereof towards us, and drive the Pollings (being sharpned and drest ready,) at such a Distance one from another, as we shall think fit for to support the Weight that shall press upon them; an Observing Miner will soon discern the Nature of Ground, whether it will prove very heavy or not, and so cut out his Timber and Pollings

* Pollings taking always the best of the Timber, it is now better Contrived by Sawing all the worst into Boards of half an Inch or a little thicker, as the Weight of the Work will require, for the further the Yockings, Doorsteds, &c. stand one from another, the stronger the Pollings ought to be.

ings, and set then nearer or further of, according to his purpose.

POSSESSIONS.

These are small Stoce, set at the beginning of every Mear of Ground, (only the Founder excepted) and are what the Miner has to shew for his Right and Title to his Ground in all Customary Liberties, be it never so valuable.

They are composed of two Stoce-blades, two Sole-trees, and two Hang-benches, with a Spindle; the Sole-trees, and Hang-benches are fastened together with Pins of Wood, Nailing them together makes them to be unlawful; they are made in all respects as the Great or Drawing Stoce are; any Stoce-grains or Blades, made of a Stick that is Forked in Growing, will not stand good, or if they be bored with a small Gimblet, or burn'd holes with a hot Iron, will not do to keep Possession; but the holes must be made by a half Inch Noger at least, * and then they are good and serviceable, and prevent all Objections that can be made that way; when they are set in the Ground if the Stoblades appear out eight or ten Inches, is sufficient, so that they may be plain to all Men's Sight; when we come to describe the Great Stoce, we will shew all the particular Members, and how they are Joyn'd together, for they are both alike throughout, only the one is bigger than the other.

It is a very great Injury to a Miner, to have his Possessions stolen from off his Ground, which
does

* Trials has been about these Possessions on the Mine, and the Defendant has been cast.

does not often happen ; but if such a thing be, and the Offender discovered, (which is a thing I never yet knew) his Punishment lies in the Hands of the Grandjury, which I suppose would be very severe, since in this Case the wrong is not easy to be valued ; there is a delusive kind of Possessions, which some Men do make use of, and of no virtue at all, which are called Prickers, and is nothing but two small Stoblades with a Spindle in them, pricked down into the Ground, and to the view seem to be Possessions, but are indeed none at all ; these well set, cannot be discern'd without looking for the Sole-trees, &c.

PRICKER.

A small piece of Iron about 15 or 16 Inches long, used in Blasting, it is made spiral that Length, the sharp small end is put always into the hole, and down into the Gunpowder, and in Raming the hole, we at every course of Raming keep turning this round about (but if it be Greased before it be put in, it may turn the better) to keep it loose, so that it may be the more easily drawn out at last ; it is much better to turn it always one way, it secures it better from breaking ; in the upper end of it is made a loope or hole, to put in a short Stick or the point of a Wedge, the better to turn it, for in Raming it is oftentimes so fastned, that it cannot be turned by ones Hand ; when the Pricker is to be drawn out, it must be done with care that nothing fall into the hole ; to prevent which, it is best before hand to put a little Clay on the top of the hole, upon the Raming fast about the

the Pricker, and form a small Pan to hold some Gunpowder, then draw it out, and put in the small Pricker; it is like a Wyer, and fill the hole with Powder, and by moving this a little up and down, the Powder will soon run down to the Bottom of the hole, and you may feel the Pricker rise as the hole fills; and this is one way by which we Fire it, otherways are already spoken of.

PROPING.

This is an old and good way used by the Antient Miners, for the Discovering of Veins, and formerly much used and practiced; at this Day it is not so much used, nor do I think that the late Miners have that Skill and Judgment therein, as the old Miners had; for who now a Days can boast to compare themselves with *Carless Keeling*, and some others whose exact Skill and Discoveries therein, made them known, and admired in their time beyond all others; if one Miner went out by himself he took nothing but his Proping Spade; if two went together, they would take a Hack and Spade to Cast with, if Occasion happened; the Proping Spade was thus, viz. the Elve Even, or Shaft, was about four Foot long, good Heart of Oak firm and well seasoned, with a handle or top upon it, and well Drest, smooth and Clean; the Spade it self was about 15, or 16 Inches long, and when shod, the breadth was about six Inches; they are shod with (most) Steel, and excellently Tempered, and very nicely made throughout.

When

When the Miner goes a proping, he always observes to Prop in such Places, as he Judges that he can reach the Lime, or at least the Top, or shod of the Vein if their happen to be one, and therefore he is very wary in his observing the Surface of the Ground, choosing sometimes at a Distance to Prop for the Discovery of the Forfield of some old Vein, which is lost or decay'd; and having duly weigh'd its randome and Inclination either way, whether any Cross or Slant Vein appears, and how that has altered its Property, and whether any Vein crosses it before its Forfield, though at a Distance or points upon it, and likely enough in this case to make an Alteration; these things are considered by him, and according as he thinks it to be the most reasonable, he sets of for the Grace of God and what he can find, turning up a round Clod a Foot or more Diameter, and in that compass Props down, still bringing up the Earth upon the Nose or end of his Spade by little and little, 'till he reaches the Stone or goes as deep as his Spade will reach, and also a good part of his Arme, but if he find any Signs of a Vein or of its Shod, which he knows by observing the Nature of the old one as if it be attended by Spar, Cauk, Tufts, &c. and also if his Soil do any way resemble the colour of the old Vein, then he is in hopes of some Discovery, but more especially if he throw up but any Mouldings, then he will soon make a Cast-hole; but if no Encouragement happen, he fills it up again.

When the Miner Props at a Venture, without having any Vein in his view pointing towards him, he is not altogether without Reasons for what he does; * for he will observe, if a Rock appears to the Day, whether there be any break in it, and its Colour, and where it seems to cut off, and more especially on Sheeding Ground; also hollow Places, or where they lie settled down something lower than the common Surface; and often times he is guided by Mole-hills, finding cast up Spare, Cauck, Soil, or Moldings, whereby good Veins have been discovered; I once knew a Place that had Grass for Hay growing on it for many Years, (whereby it may appear that Grass is not so soon seized by the Impression) at last it came to be Plow'd, and the first Year, the Corn it bore in a certain Place for 60, or 70 Yards in length, and not above three or four in breadth, was observ'd to change its Colour to Ripeness, while the other in the Field remained almost Green, a Skilful old Miner observing it, told some others then present with him, that he believed there was a Vein under it, that might occasion it; the next Year in the same Place it was after the same Manner, and so a third; one of
the

* There is also a way of Discovering Veins by Boring, and much used in some proper Places where the Rick lies, and may be reach'd by it. The Auger is in all respects as a Wood Auger, the Shank four Feet long, or as you think fit, and Bore in the Ground as we do in Wood, the Bit big enough to make a Hole 2 or 3 Inches wide; often we empty it, and diligently Observe the Soil it brings up; Veins are often found this way, and is not much inferior to Proping.

the Miners that heard the old Man at first, (as I have heard him own) give his Opinion on it, and having Observed these two Years past, sets some Possessions on it, and begins to Work, and found the Ouges with a good Vein in about four or five Yards Sinking, which confirmed the old Man's Judgment thereupon to be very well Grounded; I have likewise heard of other Veins discovered after the same manner; as also in Fields of Grass lying near the Roch, has been Observed to turn brown, and different from the rest; * these and such like Observations, are all that we Miners know for the finding out of Veins, yet there are some that will talk much of the *Virgula Divinatoria*, which when it fall in the way we will speak of.

PUNCHIONS.

Are properly strong Stemples that stand on one end, and clapt up under any Rider, Lidd, or Rock that will not stand up without such a support where these are used; there is seldome occasion for any other sort of Timber, but rather to Strengthen them if occasion be, by blocking any vacancy full of Stones walled in, which is a better Security than can be made by any Timber, to bear up Rocks of so vast a Weight

PUMPS.

Those common Pumps used in the Mines, such as Raggs, Churns, Sweaps, Forces, for drawing

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of

* For other Observations made use of by us Miners. See the *Appendix*.

of Water, these are so well known to every one, that it is as needless to describe them, as to tell you what a Bucket is.

PURCASSERS.

Poor People that daily go to the Mines, with their Hammers, Bags, or Penny-wiskets, searching in the Deads that are daily drawn and tem'd on the Hillocks, for any Bits of Ore that they can find therein, or they use to sit under the Sives, searching the Feigh for Ore, or searching in old Hillocks, and what they find take home with them at Night; the Miners usually gives some part of the Waste, or Fausteds to them, which they are very thankful of; and these are not to stay upon the Mines any longer than Mineral time, upon Pain of Punishment.

QUARTERCORD.

A Measure used in laying out of Flats, 'tis a superficial Measure, and one fourth part of a Mear; it is a Square, each side being seven Yards and one Quarter long, which is equivalent to one Mear in length, and is kept in Possession by one Pair of Stoce; if the Flat run on in length, every such Square space must have a Pair; if it prove more in breadth, it is possess'd after the same manner in a Line by the side of the former.

QUICK.

Veins, Scrins, Pipes, &c. if they bear any Ore, are called Quick; and such as have no Ore, go by the Names of Dead Veins, Rakes, &c.

RACE.

A small thread of Spar, Cauk, or Ore itself, some streat Scrins afford such Ore, and though it stand true, yet perhaps 'tis no thicker than a Knife-back; in some Scrins there is many of them together, and always lie soft, sounding like Mettle, or bits of Pots when they are loose and got out of their Place.

RACHILL.

The small Shivery loose Stones, that most commonly do ly on the Top of the Rock, forming themselves as one Sinks down more into the Nature of Beds, 'till at last by some Bedjoynt they are cut off, and under them lies the hard Rock; Veins Strick into this Rachill sometimes, but then it is in a confused manner, being throne into Joynts, but they are Soiley, and the true set of the Vein is when it cuts into the hard Rock, and formes hard and firme Sides, or Ouges.

RAISING-PAIR.

These differ from a Squarepain in this, that instead of a Collar made on the Forks, we make Tenners, so that the Forks are Tennered at both ends, and the Sliders are Slotted at both Ends to receive the Forks; the use for these is, when we begin at the Bottom of any wide Pit at the Day to Sink, we rise with these Pair upwards, drawing up the Gear, and teeming it round about them, still rising till we come level with the Surface of the Hillock, with these we raise Shafts at all times when occasion is, as to make the Hillock more Level, that the Rain may run off from the Mouth of the Shaft.

R A K E

R A K E.

This Word is used commonly for Vein, yet we may observe some Difference therein; one shall never hear a Miner say I have found a new Rake, but it is common to say I have found a new Vein, but after Work is made in it, and two or three Shafts sunk, and a Company of People employed thereon, then to call it a Rake seems fit enough; it is apply'd to any old exhausted Work, and many Veins in several Countries, go and are known by the Names of *Long-Rake*, *Old Rake*, *Gang-Rake*, &c. and I suppose any where where there are Mines found out, they are often times call'd by the Name of the Finder, as *Guy's-Rake*, *Rawley's-Rake*, &c.

R A M E R.

An Iron Instrument used in Blasting, half a Yard or two Foot long, the Shank is smaller than a Nogens, on purpose that it may go down by the side of the large Pricker, about two, or three Inches of the end that fastens the raming, is made round to fit the Hole, yet so that it may move easily up and down with the Hand without any fastning at all; in this thicker end is made a Notch, or wide kind of Riggot up the side, to receive the Pricker which lies in it, while the Hole is raming, and the Ramer slides upon the Pricker, going down and up very easy and well; the raming may be prest down with as forceable Blows as you please, without the least Danger of Sticking fast; only this may be noted, that in putting in too much raming at a time, endangers
making

making the Pricker too fast, and then when you come to turn it round it may be in Danger of breaking; the raming may be any thing that is Dry and soft, as Sparr, Cauk, Tufts, Brick, &c. but if it be such as is hard, as Stone, or any thing mixt with Chirts, it is not good at all, because they cut into the Pricker, and so make it too fast and break it. Note, That Sand and Greet, are the worst Raming for fastning close, as any I know of.

Random of the RAKE, or RANGE.

That point of Compass that the Vein seems to hold or run on, * as it appears to the Eye above Ground.

R I B B.

Most Veins carry their Ore in Ribbs, which is that solid Part of the Ore that sets forward according to the Sides, and up and down in a Forfield, so that in driveing we leave it firm both in Roof and Sole; many times a Vein will carry two Ribbs, and softness between them, and often self Lumps; these Ribbs are according to the Nature of the Vein, some bearing thicker and some thinner, Ribbs even from a small Rute, to the thickness of a large Rider; the richest and finest I ever saw, † was about four Foot thick, and many Yards a Gate was cut in it, and again its Forfields both ways setting the same thickness in Roof and Sole; and likewise a Sump was Sunk therein

* If the Vein does not run as we expect it, but alter its course in driving on, we shift our Possessions to the Range of the Vein.

† In Sir George Wynne's rich Lead-Mine in *Flintshire, Wales*.

therein, which had both ways a Stool end of many Faddoms high, firm and found as a Harp-String; (as we Miners say) Ore in standing in Ribbs is more surer to be depended on, than when it lies and found in Lumps and Pieces; and a Ribb standing hard is more certain to endure than one in softness, and lastly, a thick one is much better than a thinner.

RIDDLE.

These were made of stronge Wyer, and more used in the Customary Liberties than now they are, because Antiently they say, that the Miners Ore was all Duty-free that would go thro' the Holes, which was one Inch square, but thro' their abusing this Liberty, that Freedome was retrench'd, as indeed well it might, when it appeared too plain that some being to covetious, knocked down their round Ore, to make it pass through the Riddle, which was so base a Practice, that no Ore was exempted after, but such as was plainly to be discern'd to be Faulted Ore, and Smitham; the Miners still Riddle all their Wash Ore; so that their is Wash-Ore, Small-Ore, and Smitham; the Reason of this Seperation is of good Advantage to the Miner, where it is sold by Measure.

RIDER.

A Stone runing in the Vein, by which the Body of the Vein, let it be big or little, is divided into two parts, runing on both Sides of it; these Riders are of great variety in the Mines, as well in thickness as length and depth; and all Veins
in

in general, whether Quick or Dead, are Subject to them; now the approach of a Rider in the Work is heard to be known, except we have had some experience in the Nature of the Vein, and two Veins to be alike, and attended with the same Symptoms, is as I think, very rare to be found; yet we have these following Signs to Judge by, viz. When some small Stones come in and increase in bigness or length, and are Mailly Coated, foreshews a Rider, and more sure if they grow harder and faster in driving forwards, &c.

In some Veins a Sliding or a Cross-joint betokens a Rider * so does sandy, or gridly Gear coming newly in; sometimes the Ore, or whatever constitutes the principal Part of the Vein will be more grown together, after the manner of a Burr, but suddenly again part into two, with the before mentioned Signs between them, may shew a Rider at hand; at a Way-board, or large Bed-joynt upon Sinking, a Rider may come in, and any notable Cross-joint in driving may do the same, and also unusual softness or Shacks; these Signs here mentioned for the coming in of a Rider, will be found the same at its going out; but here is one Sign of a Riders going out, which appears only by the Rider itself in cutting of it, and that is the thickness of

R

it,

* Riders are so frequent in Veins, that it is very necessary for a Miner to observe the Nature of them, thereby he may be able without any surprise, to give a good Account of any alteration that may happen, and Experience will Teach him more in the Nature of them than I can tell him by Writing. *Note*, Back-strings are caused by large and broken Riders,

it, for it is not usual at the first coming in of a Rider, that it appear at first Sight to be the thickest part of it, but they come in as Miners say, like a Fish-Tail, still growing thicker as more Work is made in them, and when they are at the thickest they will begin to decrease 'till they go out of a Fish-Tail again.

Many times Riders run far, and sometimes but very short; sometimes the Vein is almost made up of Riders and Joynts, with Strings of Ore in them, or some small Blanchs in the Riders themselves; such Places are esteem'd to be very hopeful and likely to carry more Ore when the Riders goes out, be it either in Sinking or Driving, for in the first case we expect some Way-board or Bed-joynt to alter it; in the latter some Cross-slip, or End-joynt may cut them off.

Riders may be for Substance either of Stone, Spar, Kevill, Chirt, or compound of a Mixture of these, and sometimes they may have Ore mixt amongst it; now this is to be noted, That if a firm Rider of Stone shall run End-ways, with a Sticking on each Side carrying some Ore for one half Mear of length, without any visible Communication between them, it is to be esteemed a new Vein, and especially if the Ore be but of a valuable Quantity; or else it is never taken Notice of, for who regards dead Veins, Strings, or Rider-joynts.

R I G G O T T.

The Notch or Nick that is wont to be made in the edge of the Plugg from one end of it to

the

the other, into which the Gunpowder was put and hard crusht in, so that it might not shake forth by Driving the Feathers; this was Priming the Plug.

A R I S E.

When Veins or Pipes take a chop up higher than ordinary into their proper Lids, whether-soever the Lids be Stone, Mixt-beds, &c. this is opposite to Troughing or Choping down; these Rises are for the most part the most Flourishing and Richest Parts of all Veins, but Pipes more especially where they happen.

R O A C H.

The same with Rock, and it is of divers Kinds; first the hardest and most solid parts of the Earth that we know of is Rock, of which some is Lime, some Greet, some Chirtt, some a mixt sort without a Name, as at Styperstones, in *Shropshire*, which is not fit for any Use at all, except to mend the Highways; each of these produce good Veins and Pipes; the Lime-Rock in most Mineral Counties, seems in all probability to be the Basis or lowest Part, upon which all other sort of Rocks do rest; Shale of what thickness soever it be, lies upon the Lime-Rock, unless sometimes a hard black Clay interposes betwixt it and the Lime; Greet tho' of a great thickness has always Shale or black Clay between it and the Lime, so has Chirts black Clay, and some Stone Beds between it and the Lime; what thickness these several Measures may be, is unknown but by Experience; now since the

Lime Rock seems to be the most solid part of the Earth, (as to us) on which the more softer parts that lie nearer to the Superficies resteth upon; and since by all the Experience and Proofs, that all Miners have had in all times, and in all Places (so far as I know) in Sinking after Veins to the greatest Depth within this Rock, could never yet discover any other Substance that this Lime Rock should be founded on; it may be a hard thing to determine its thickness, since for any thing we know the central parts of the Earth may be the same.

And here I shall make one Remark by the way, and 'tis this, viz. we find that there has been many good Veins that have endured long and got great Riches, have been wrought to a vast Depth, yet it is found in the end to grow hard and Twitchy on the Soles, which is an Argument to me, that the great Creator of the Earth, and all that is therein has placed, all Minerals for the Use of Mankind, at so proper and fit a Distance within the Earth, that Men by their Industry, may get and exhaust them, or at least the greatest part, by using one means or other; tho' that great Obstruction of Water many times attend it, yet by the Use of proper Engines, we see it managed; so that one may conclude that God Almighty has not created rich Veins of Mettle in the Earth, and placed them as useless, and out of the reach of Mankind; but here is another thing which great and Learned Men speak of, to wit, of vast Cavities within the Earth, Rivers of Fire, and other some say,
that

that its Axis is Hollow, through which there is a Passage for vast Quantities of Waters which are Suckt in at the North Pole, and come forth again at the South, but these things fall not in the Miners way, nor the least Sign of them, nor of several other things in the Earth mentioned by them; though it may be truly said, that the Miner sees further into the Nature of the Earth than such Men can, * but is not able to frame a Theory so well thereof, tho' his Experience may furnish him with many rare Notions of the same. But enough of this at this time.

ROOF and ROOFING.

Is that part of any Gate that is uppermost, or over ones head in cutting any Drift or Waygate, be it higher or lower, Hard or Soft, Quick or Dead, Wholes or Oldman; and Roofing is rising upwards in the Work, be it either directly or by Degrees, which is very common, either after some Ore, or for some other conveniency, as Wind, meeting of Shafts, Sumps, or striking to some other Gate above, or for Trial for Ore; in meeting Shafts, this Roofing may seem very hazardous, but if done by a Skillful Dialer, and by

* The Appearances that we find in the Interior Parts of the Earth, seem very agreeable to Dr. Burnet's Theory, being huge Chafms filled up to the Day with Heterogenious mixtures; and large Bodys of Oak-Trees all decayed in a manner to Earth, in which by cuting it, I have found small Threeds run up it like fine Wyer, hard and shining when cut assunder like Mettle; and I have seen Timber taken out of a Bed-joynt, that has been covered by the hard and sound Rock 13 Yards thick, and the Joynt not above 4 Inches thick in Sinking a hard Shaft; no Old-man near it.

by a Dial that he is acquainted with, and knows he may trust; it is certain enough, and may be depended on, as I have known by Experience.

ROOLINGS and ROOLING-CORFE.

I only thought fit to mention these, tho' now a Days they are worn out of Use in dressing of Ore, and 'tis as well done without them, so not worth speaking any more of.

ROUND ORE.

'Tis the best and largest of the Ore; in places where it is weighed by Hundereds, and sold by the Tons, the Pieces are Dressed and Scraped, as large as conveniently they may, so that they be without Loughs, Dotts, of Clay, or Spar, &c. or whatsoever is not Ore itself; where it is Measured, it is all broken into sizeable Lumps, such as will make Measure on the Surface of the Dish-trough; this sort of Ore is always accounted the best by the Ore-buyers, and where Ore is sold by weight, exceeds the Price of small Ore Twenty Shillings per Ton.

RUDDER.

An Instrument made of Iron, or at least the end of it; 'tis much like the Head of a Lance, which Officers of War carries in their Hands, but made somewhat broader, and well Steel'd and tempered the Handle about two Foot long; this we Use to let in the ends of Sliders, or Head-trees, where the Web of the Hack is two short for that purpose; the want of having this in more Use in some Places, (if the Timber be but

cut

R U

cut of a fit length) would in all likelyhood preserve many Shafts from falling in, much longer than usually they do; and the Reason is plain, since they always fail first in some Corner, only for want of the Sliders, having more hold at the ends; this seems to be the Workman's Fault, but if any Timber breaks, which is sufficiently stronge for the purpose, (except it be Deceay'd by length of time) in such a case the Miner can be in no Fault at all.

A RUN.

This is allways a Branch that flies out of a Vein or Pipe, or lies near to it on one Side; they usually fly out of the more greater or principal Vein or Pipe, and are more less or inferior in their forme or manner; if a Run attend a Vein, it will go paralell with it; if a Pipe the same, and lies at the same Wayboard, and if it keep not too far from it, may sometimes Skirt together, especially when a kindly Joynt Crosses them, then they will spread themselves more after it, and both may be very good.

RUTE.

A small thread of Ore, and those that are of the least Size of all, such are called Rutes when they are under a Finger thick, even to the smallest Size; these often stand very true, and it may be a Question, whether they be not more pure than that that lies in stronge Ribs, for it looks more vigorous and quick, and more truly Solid. These Rutes are sometimes enclosed ~~in~~ in the hard Rock, and then can be worth nothing

thing except the curiosity of looking at them; sometimes there are one or more of them in a Stickin, that may be slit with a Foudenhead; I once saw a Vein where an old Miner wrought, that carried in some Places more than twenty of them at once; his Vein near a Yard wide, and soft dry Soil, which was a most curious thing to behold, the Lay in so stright Lines and uniforme, very much resembling the Strings of a Harp, and could a piece of its compass been taken out whole, it would have been a curiosity worth keeping.

SADDLE.

These are used for drawing Shafts or Lumps, Double-turn, and are placed on the middle of the Turntree, Antiently rhe Mimers used none, than came the Iron Saddle, which was put upon the Turntree, after the manner of a large broad Hoop, and the Edges thereof turn'd up, so much that the Rope could not get out of it, with two or three Bouts there on; these being so Troublesome to make, next was Framed bits of Wood cut for the purpose, and nailed on the Turntree, forming the Compass of a Saddle for the Rope to ride in; these were convenient enough, but then the Rope soon wore them, and also the Turntree; then lastly came the Use of five strong thick Iron Plates, bent into the forme of a Saddle, being at the ends turned down with strong Spickes, to drive down into the Turntree, and placed at equal Distance one from another; and this is the way now used in most Places, and it is very good and most durable.

SAUNTE.

SAUNTTE.

The first pee or bit of Ore that the Cavers find in a Morning by Purchassing, on which they have some Observation for their Success all the Day after.

SAWCERS.

Those round Pieces of Iron fixt on the Sawcer-hooks, on which the Leathern Suckers are put in Chain-Pumps, at about two Foot Distance from each other.

SCAFFLINGS.

What comes off from the Ore in Dressing it, to make it fit for the Merchant; I mean the Bing or Round Ore, which is called also by the Name of Chippings, Scrapings, or Scafflings; in Caukey Ore, the Scafflings are used to be beaten a little with some small Tool, to prevent the Ore being Tagged with them.

SCRIN.

The least or smallest kind of Veins; some are so small that if it were not for their Ore, or for their Cauks, Sparrs or other Signs that accompany a Vein would pass for Joynts only; these Scrins are for the most part Blasting-Work, and formerly Fireing was most used in them, and their Drifts were streat and high one Gate above another, and fliting the Sticking between them; and they are very apt to alter for better or worse, at Wayboards or Cross-joints.

SKIRTS.

These have relation properly to Pipes, Bents,
S
Breaks

Breaks and Levels, sometimes in Veins ; and it may be noted by any observing Miner, that in Pipes the Skirts lies guided by a Roof Stone, or Wayboard, that the Pipes break at, except it be altered by some Slip, and then the cause is discernable enough ; and Bents, Breaks and Levels, depend on the same cause tho' it be in Veins, and without some large Bedjoint or Wayboard to guide them along, they are feldome of any great Value ; but yet for all that such there are, but they never run on Regularly, but sometimes up, sometimes down, breaking and lying in Holes, and Loughs one into another, as wanting a proper leading, that they might orderly follow, so that it is very rare to see a Skirt in them.

SEAM.

A very small parting in the Stone, Rock, Rider, Ore, &c. and it may be of as many various sorts as Joynts.

See Joynts, before.

SEATE.

In the first appearance of some Veins, and Pipes that are Lidded, which we discover in such Lidds or in Shale, if they bear any Signs of the Vein, Pipe, &c. we may safely depend of it, tho' it grew no wider to lead down to the Body of the Work ; in Twitches, the smallest parting in driving through them, we call the Seate, which in such Gripes, does run through them, and breaks open again, so that the Vein returns to its former compass.

SELFOPENESS.

SELFOPENESS.

The same with open Shacks.

SERVING the SIVE.

This is always perform'd by some Woman, who has a Box, or Serving-Corfe, into which she fills the Boofs, Knockbark, or whatever is to be Wafht, and brings it to the washer, and puts it in the Sive; this Server likewise carries away the Wash-Ore, to the Ore-Place, it being their Bufiness.

SERVICEABLE.

The making a Vein, Pipe, &c. so that is having one firm Side at least, for half a Mear in driving forwards; sinking downwards is nothing at all regarded; this confirms the Vein, and we call it Serviceable, after crossing of Pees, Tees, Braks, Jumbles, or what other disorder may happen that the Vein cannot be easily made out.

SET TOP, and UNDER SET.

There are some Veins when once discover'd, carry Ore of a whole Stool-end, twenty or thirty Yards in Depth, for many Mears of Ground in Length, without any great Alteration that is worthy Notice; then the Ore cuts off on the Sole, and the Vein becomes hard and streat, so that there appears but a small leading, and endures so many Yards in Sinking, and then at last breaks over again, and the Ore proves to be as good and stronge as ever it was before; these Levells are called Sets, as the first is the Top-Set, the second which is found out by Sinking

through the Deadness, is called the Under-Set; these commonly do decay in their Ore very suddenly, and as suddenly break and come in again; if a fair leading sets down under the second Sett, it may in all probability lead down to a third, and so on; but however, I never yet knew a fourth Discovered.

SHACK.

These are of two sorts, first, open Shacks, is when we Discover any Concave, or hollow in the Vein, or on some Side of it, which is very common in some Veins, and that too of a large compass, as 20, 30, or 40 Yards in length, wide and spacious, bounded by hard Rocks; and indeed 'tis something horrible when one approaches such open Shacks and enters in, and searches those darke Caverns amongst Rocks; some fallen, others torn from their Places, yet hang so, that it is very dreadful to pass under them, therefore we are always very cautious in touching, and passing them at first Sight; some Veins are the better for these Shacks, other some they spoil and make good for nothing. The other sort of Shacks, are such as are not hollow but filled with loose Gear, as small Chirts, Stones, and Gravel of several Colours, but most inclined to black, with wet either more or less; these are difficult to Sink, or drive in without good care be taken; many of these kind appear to the Day, by the settling down of the Earth in Holes and Pitts, and their taking of Water;

these

these we call Shack-Pitts, * and in some Places, we account them to be sure Signs of a Vein being not far from them; some Miners will be so bold, as to adventure to tell before hand, which side the Shack the Vein lies on, but this is but hit or miss, unless he has had some Experience of the Ground there, or thereabout, for Ground is of as different a Nature as Veins, and none knows the variety thereof, 'till by some Workmanship therein, he is able to give an Account; there is another thing we call Shack, and that is what Shakes forth of the Corves, in carrying on the Soles of the Drifts, or by drawing up the Sumps or Shafts. †

SHAFT FOOT.

The same with Sole of the Shaft, that is to say, the bottome of the Shaft, yet we Miners never call it so.

SHAFT.

The same with Hook or Sweap; sometimes the Pick-haums are called so.

SHALE.

A tolerable hard and black Substance, lying most commonly in some Places next to the Lime-Rock, most of it will cut pritty well, rising in
thin

* Shacks on the Hading Side of a Vein are usually harder bounded by Rocks, and prove better for taking Water from the Vein, then those on the Hanging Side, they being more apt to let the Water in.

†. Shaft is the Square Pit that is sunk down from the Day, be it big or little, at which all that is necessary is drawn up, and temed round about it, which is called the Hillock.

thin Pieces; the Joynts in it are of a red Colour, or gankey, when it is sunk some space into it is mixt with Binds, and when it is drawn up to the Day, it melts and crumbles into small, and into much lesser Pieces; * it is subject to Water, Veins will sometimes put up into it, and bear Ore, otherwise it seldome fails in any considerable Vein, but there will breath up a Spar leading in the forme of a Ribb, and probably Smuts of Ore in it; this Shale seldome requires any Timber to support it, it is very strong and Sulphurous Work, and apt to breed the Ground-Damp, without a good Wind to throw it out.

Shiver, *See* Rachill.

SHOD.

The Signs of a Vein at or near the Day, when there appears Soil, Spar, &c. but more especially Moldings, and small Peees of Ore, yet lying at a Distance from it on the sheeding Side, and by following these small leadings on the rising Side, the Vein may be discovered.

Shute, *See* Blasting.

SIDES.

The hard Rocks be they of what sort they will, that incloses the Vein as it sinks or runs along forwards, and bounds the Vein on both Sides, and distinguishes it from Pipe or Flat, and makes or formes the Vein; and if one or both of the Sides be smooth and kindly, it is a good guide
where

* As the Shale lies on a Level or Diping, so may be expected the Lime Rock to lie, that lies under it.

a Miner ventures for Ore, and may probably break, and alter in sinking or driving, where the most hopeful Signs appear by it; *Note*, Sides are observed to be of different sorts according as they are situate; (which I have noted before) but this may be added, if the Vein run *East* and *West*, or near it, we distinguish them by *North* and *South-Side*, or more oftner *Sun-Side* and *North-Side*.

SILL.

In soft Work where Doorsteds are used, and the Sole of the Drift so soft, that it will not bear the Forks without letting them sink down by the weight that is likely to be upon them, then we clap a Sill under them, which is a piece of Wood lay'd a-cross the Drift, long enough that both ends of the two Forks may stand upon it; formerly the Fork were used to be Tender, and the Sills made with Slotts to put them in, but now that is laid a side as too troublesome, and instead thereof in either end is made a Step, or Stope with a Gouge, and the ends of the Forks sharpned like the Edge-end of a Stemple, for to stand in those Stopes, which does as effectually as the other, if they be but made deep enough; and if but one Fork want the help of a Sill, a small Log of Wood like a Mans Foot if made Flat, and a Step cut in it for the Forke Foot, is sufficient in such a case; and many times neither of these are ready, a flat Stone with a Step made in it with a Pick, may serve very

well ;

well; * but in the two last mentioned they ought to be let down pritty well on the Sole, but sometimes it falls out that these Steps may fail by side Weight, and so drive the Forks at the Foot inwards; but if that be discerned, it may be cured by driving down a Spurfork hard between the two Forks at the Foot of them, and at each end an Iron Nogg driven into the Doorsteds, to hold them down.

A SINK.

It is the same thing with a Chun, and for Sinking, whether it be of Shafts, Sumps, Turns, Lumbs, or Sump-holes, are, or will be spoken of in their Turns.

SIVE.

'Tis of Wyer about six Inches Deep, with cross Bands of Iron under the Bottom of it, wherein all the Boofs, Knockbark and Smitham, was wont to be washed, but now a Days not so much used, except in the *High* and *Low Peaks*, where venturing Miners get but small Quantities of Boofs, and mostly dry, and is drest up but once in a Fortnight, or three Weeks; but in other Places where much Boofs is gotten, it is all Buddled, and the roundest pickt out and knocked down, the Smitham is likewise Buddled, and is best done if there be but Water enough to supply the Bubble with a constant running, and hereby it is quicker Dispatched, and is made very

* Many times in stiff dry Clay that must have Timber, none of those are used, but the Forks cut with broad Ends, and let 5 or 6 Inches down into the Clay, will do very well.

very good Ore; these they call the Running Buddles.

A SLAWM.

A remarkable Joynt in the Stone, Ore, &c. and fill'd with Clay, and this Clay by some Moisture in the said Joynt, is very soft and Greasy, so that it will cleave to a Mans Hands, or any thing that touches it; and these are called by the Name of Slawms, and will alter the property of Veins, or Scrins, Riders, and Ore it self.

SLITTING the STICKIN.

This is no more than with some fizeable Tool or Tools, to cut it in between the Sides so far as conveniently it may, be it either hard or soft; and thereby the Stone is freed, that it may be the better gotten, by what way soever it may Require.

SLIDER.

Two of these are required to make up that sort of Timber that we call a Square-Pair, and Sliders are cut of such a Length as the Miner Designs the Square of his Shaft to be; the common Square is about three Foot, betwixt the Nog, and the Mortice, beyond which there is fix or seven Inches for hold at the Ends, so that they may be laid fast at the Ends; now care is to be taken in the making of them, that the broadest of the two Edges may be upwards, both for the conveniency of Climbing, as well as to look the more Handsome; and likewise when there is a crookedness in them, it is amended by Hewing them something into forme, and the

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bent

bent or bulch Side is to be laid outwards, in Regard it may hold more Weight, as well as look much better to the Eye; and these two Sliders are to be laid always with the Nog-hole of the one against the Mortice of the other, and as Level and Square as may be, and at such a right Distance, that the Forks may be titely driven up against them; one thing more is observed in laying in the Sliders, that if the Nogg be now placed in this Corner, the next under it that is set, must have the Slott there, so changing them every Pair, and laying them Stright and Plim one under another; but if I might advise in Sinking with Square Wood, or Yokings, (both being the same thing) where Shafts are deep and Sunk far with it, I take it to be the best and most surest that it may stand longer, to let the Timber be of an exact Square, and to change the places of the Forks and Sliders every Pair, and leting the Sliders Ends well in; I know this is not the Practice in any place that I know of, but a expert Miner may easily know the Reason of it, and he that tries it, will not fail of his Expectation.

SLOT, need no Explaining.

SMALL ORE.

All is either small as Washt-Ore, and where it is weighed the Smitham is mixt with it, so there it all goes under one Name, the Round or Bing only excepted.

SMYTHAM.

SMYTHAM.

The smallest of the Ore that goes through the Wier Bottom of the Sive into the Fat, in washing Boofs, Knockbark, &c.

SOYL.

By Soyl we understand those sorts that do naturally accompany a Vein, and those are of different sorts, according to the variety of Veins, yet most are inclined to redish, brown, or yellow, only some hard Sparry Veins, or hard black Works excepted; Vein Soyl is always different from the Colour on the Surface of the Ground, but near the Day it may be a little Tinctur'd with it, but in Sinking it will grow more and more Soiley, 'till such time as it comes down into the Body of the Vein.

SOLE and SOLE TREE.

What other People call the Bottom, we Miners the Sole, as the Shaft, Sump, Drift, and the Name never varies, tho' it alter daily by Sinking; as to Day it is hard upon the Sole, or soft upon the Sole, or a whole Sole, or Water upon the Soles, &c. a Soletree is that part of a Pair of Stoce in the middle whereof a Mortice is made, and the End of the Stoblade is Shoulder'd on one Side, and put therein, and fastned with Wedges, and Pins of Wood, and towards the Ends the Hang-benches are fastned; in the Stoce there are two of these Soletrees, and they ought to be Stronge and Sound, for on them lies all the Weight of the Drought, whethersoever it be Work or Men that is drawn.

SOUGH.

A Way or Gate, driven up from some convenient Place to the Vein, or Veins that are troubled with Water, on purpose to lay them Dry by letting off the Water; these are for the most part very chargeable Pieces of Work, and long in Perfecting where they are hard and cut through the Rock; but this care is taken, rather than cut up on a Stright Line in the Rock, the Miner will go a space about, if so be, he can but light on the End of some known Vein that holds its Randome not far distant out of the way, thereby trying the Vein and gaining a more easy Passage up; also to avoid the Rock, sometimes it may be done by going something about upon the Dipp of it, yet some must be cut at last.

These Addits on Soughs if they prove soft, destroy a great deal of Timber, especially in Sand; the great and most dangerous Work in these, is letting off the dead Water from the Works, into the Level, which if it be done at unawares, makes great Confusion in the Sough, doing great Damage by washing in, or sludging up soft Levels many Yards at once, and driving Men before it with so much Force and Fury, that they are inevitably drown'd, and racked in Pieces; to prevent this disaster, some will keep a long Noger in the Forfield, always two or three Yards before them, yet this is very hazerdous; others make use of a furrer way thus: They will be at the Charge of Sinking a Shaft, when they think they approach near the old Works down to the Level,

Level, and from thence cut and let the Water off by Degrees, which is the best and safest way that can be used in Soft Works, where there is a great Weight of Water.

* SPAR.

In general it is a white Substance, in Veins, Pipes, &c. of which there are divers Kinds; first Glass Spar, of a white Colour and very clear, and if you break it, it seems compacted of thin Flakes or Leaves, Transparent and white, and breaks after the Diamond Fashion; this sort lies in Lumps, and with fine Clay, or some remarkable Soyl about it, and in some Veins is a sure Sign of Ore, and sometimes accompanys the Ore itself; the second sort is Sugarcandy Spar, from the Resemblance it bears to it in Colour Shape and Softness; this is looked on as a good Sign of Ore; the third is called Horsetooth Spar, for the likeness that it bears to Horses Teeth, but then it is much larger, this is white and hard, and of a dry and barren Nature, and not attended with any thing of good, and it is most common in hard dry Loughs, Water Courses, and Shacks; the fourth sort is a white hard, and solid Spar, whole Veins being composed of it, of many Yards thickness, mixt with Studs of Ore; these sort never yeild much Round Ore, but are good induring Boofs Works, because they
are

* I know nothing in our Mineral Kingdom, that Resembles Lead Ore so much as Spar, for let the Difference be what it will in the Ore, we have the same different Kinds of Spar, so that it wants Colour and Weight only to be like it.

are hard, and accounted to be the best of Ore, at least for Melting; some of these vast Bodys of Spar Veins are not mixt throughout, but rather near to the Lime Sides which bounds it.

SPINDLE.

A sound handsome Stick that is fastned in two Slots, which are in the Stoblades, five or six Inches below the Turntree; its Use is to hold them fast, and at a certain Distance, and also to lay ones Hand on, when we first enter the Shaft to go down, and the same also in coming forth.

SPURFORK.

A small sort of Fork, of Use only to keep some other Timber in its Place, such as square Pairs in Shafts or in Sumps, and sometimes used to hold Doorsteds in Drifts, or at Sumpheads a-funder; they are mostly Collered at both Ends, and driven between square Pairs in the Corners, and are a good way to support a Shaft, it so be that we begin from a Pair that lies upon a good and sure Foundation to trust to, that it may hold up the rest, or else the whole is in Vein.

SQUAREWOOD or TIMBER.

This consisteth of two Sliders and two Forks, which see in their Places; they are never of a square tho' so called, but the Fork is the shorter by two or three Inches, than the Slider is between the Slot and Nogg.

START ORE.

It is to take up the Dish, when it is full of Ore and Measure made, and put it into the Bag; hence 'tis said, who Starts this, &c.

STALCH

S T

STALCH.

A Piece of Wholes that is left uncut, yet we know it to be cut over the Top of it, and under, and at both Ends ; * a Stalch joynes to no other Wholes or part of the Vein, but stand by it self, some are very large sometimes, and though the Oldman has been round them, yet they prove to get a deal of Ore when cut into.

STAYS.

Small bits of Wood cut on purpose to hold Wind Trunks in one Corner of the Shaft, and Nailed from the square Timber to the side of the Trunk, to hold them fast that they fall not.

STEMPLE.

Such a Piece of Wood be it great or little, that is set between the two sides or to support a Rock ; the one End is called the Egg End, being made so like the End of an Egg, for which there is made a Stope in the side to set it into ; the other is called the Head End, not cut even off but Sloped a little, that it may the better be driven into its Place ; the Use of these are to Climb by, or for making Bundings, and many other useful things in the Work. *Note*, Where the Head End is driven, is always made a long Stope, which incloses it so fast that it cannot get out.

Steps, *See* Sills.

Stence, *See* Task.

STEWARD

* There are some Miners that call these Stalches, by the Name of Midleathers, as not knowing the Difference between them.

STEWARD.

The Person set by the Masters of the Work to Oversee the Work, and the Men Employ'd therein, who Cut, Sink, and Drive, according as he Directs; he set them on Wages or Bargans, as Cope by Tons or Yards, or Yards and Tons mixt, to get Ore for three Months, which is the common time, or more or less, as him and his Miners can agree one with another; he takes care that they keep the Work in good Order, and to draw forth their Deads; or if he give leave to them to Cote or Lodge any, he sees the place first, that nothing of Ore be concealed from his Sight; he also takes care of Budlers, Washers, Scrapers, &c. and of Weighing the Ore, or Measuring it, and for all Necessaries belonging to the Work, and pays every one his due, whether Wages or Bargans that are concern'd under him; moreover, these Stewards are of two sorts, first, such as are Honestmen, and the second are such as are otherwise; and since the first may be of great and good Service to his Masters, and all that are Employ'd under him, by his Integrity and Justice, so the other by his Clandestine Practices, may prejudice them both; this latter sort I shall not concern my self with, as not worth while, but will give you

An Honest STEWARD's Character.

He stands as a Just Ballance between his Master and his Miners; no Passions draw him away; he scorns Gifts and Bribery from any Man, because he knows they are to open away to pick

pick his Masters Pockets; he takes care of his Workmen, and pays them as honestly; he is easy of access, delights to do Justice, not conceited of his Abilities, but will advise with his Workmen, and yeilds to Reason; his Place can never much enrich him, because he's honest, and knows what a Stewards Riches smells of; he makes his Accounts clear and just, with regard to his last Audit coming on; he dies happily, and much lamented, and by the consent of all Men, has this rare and wonderous Epitaph,

HERE lies an Honest STEWARD.

STICKING.

All Scrins, and smaller Kind of Veins, that afford not Shoulder Room, their width between the Sides may be called the Sticking, and this is the common Name that we Miners give to all of that Size.

STOCE.

These are either great as drawing Stoce, or little as Possessions, and are both of equal Power to keep a Mear of Ground in Possession; these are mostly described before, only the Stoblades have a large Slot in the Tops of them, in which the Gudgions of the Turntree lies to run round in Drawing.

STONE.

Any Body knows Stone when they see it, but by us Miners It is Distinguished into divers Kinds and known by their several Names thus:

U

Lime

Lime	{	Stone.	Toad	{	Stone.
Black			Curl'd		
Mailly			Sharp		
Wheat			Tough		
Snailhorn			Mixt		

These have Relation only to the Rock, excluding Chirts, Binds, Booders, and such like; Lime Stone is known by most Men, and the black sort of it also; Mailley, is a softer sort of Lime very dusty, and will cut pritty well; Wheat, is the finest of all Lime Stones, and a curious Grain, it is the most white when it is broken, which it is not hard to do, and not very common in Mines; Snailhorn Stone, is a coarse Stone, having mixt Knotts within it, much like Snailhorns when it is broken, and hard to break; Toad Stone, so called from the near Colour it bears to the Colour of those Creatures, but 'tis a Stone good enough to cut; Curl'd Stone, this has Balls very large of knotty, round, and written Lumps in it, and never Blasts, Cuts or Breaks well; the Sharp Lime is something inclined to black, and very hard, but very good for Shuting, and will fly very well; in this Stone is found lying in small Loughs, a black and soft Greasy Substance like to Tar, it will Stick to any thing that touches it, and smells most strongly of the Stone; a small heat will melt it very thin, and may easily set on Fire by a Candle; some say it has some particular Virtue, and so perhaps it may, if some Skilfull Naturealist had it in Examination; Tough Stone, it is
hard

hard to make Gunpowder break it clear out, except the holes be very weak, which should seem as if it should Streach to let out the Powder; Mixt Stone, is such as is blended with hard Ghirts, Spar, or such like, and turns out very hardly by Lumps; Experience will shew a Man much Difference in Stone, and probably beyond what is here exprest.

STOOL-END.

This is always taken and known to be the whole Ends that we leave in Sinking, be they Quick or Dead, and have this remarkable Difference from what we call Stopes; the one may be of any Number of Yard of Height; the other but what a Man may cut and take before him, as he proceeds forward in cutting the Work; and besides Stopes, are always Toploose; these Stool-End are always accounted to be firm and whole, which gives the occasion of having them mention'd in the Articles in Customary Liberties, and thereby compelling the Miner to drive on his Vein from Stool to Stool; that is from the Founder to the next Taker, and from Taker to Taker; but lest I be not rightly understood, I will explain it a little. The Lord of the Mine, after granting the Miner all reasonable Priviledges, took care enough of his own Interest, and this amongst the rest, that upon Discovery of a new Vein, the Miner is obliged to drive it vigorously on from Mear to Mear, and altho' at the end of a certain Number of Mears, a Taker comes in; yet I the Founder must use no delay in chac-

ing on my Vein from my Stool to his, that is from Stool to Stool, or from Stool to Stake; and there may be sent down by the Taker, (if he suppose that I neglect it) two or more of the Twenty-four to view the Work, or the Barmafter may do the same in behalf of the Lord; only there is these Exceptions, if I be hindered for want of Wind, or overpowered by Water; but in these I must use Endeavours to remove the Obstructions, or else they will force me to resign.

STOPE.

This is a part of the Vein that is always cut Toploose, and in hard or watered Works, they are the most usual way of working, as well as the most advantageous; in hard Ore that is stronge, we drive at the Vein Head in the first Place, because there it is likely that the Vein may be the most Kind or Leppey, and so a way may be cut forwards with more ease, and to what length we think fit, or at least this Top-gate must be kept always the foremost, and then and we begin in the Stool-End again, and cut before us what Heighth we think fit, as three, four or five Foot, and this being Toploose, gives more Liberty for the cutting thereof, than the taking of a whole Roof; and thus many Men may Work at once, taking each a Stope before him, one after another, and consequently raise more Ore, for 'tis certain they will cut more Ground in these; (in Water-Works it is much used) this way by letting down the Foot of Pumps, which is very hard and Slavish, but most of all under Raggs

Raggs, and other large Chain Pumps, 'till a convenient Stope be gotten, then cut it forwards on a Level; if Twitches happen in the way, they are all cut up, except the Miner for some good Reasons thinks it not fit at present, but leaves it and drives over the Top thereof, (if it rise not too high) and if in Driving his Vein opens again at the back of it, he will chop in a Pump, and throw his Water over the Twitch, and so go forward again, or Sink as he thinks fit to his best Advantage; in these sort of Works, when the Miner has gone as deep as he can, as being over Loaded with Water, and yet his Ore continues Sinking on his Soles; then he will make use of a very long Webb'd Hack, Strong and well made fit for the purpose; with this he will cut and plunge down his Vein into the Water, so far as he can reach to take it out; and likewise he will use large and long Wedges to set at the back of his Ribb, where he can find a convenience by groping down in the Water with his Hands, and also making use of his Traffel, which is of good Use in such cases; and this is the last Work that we do when these watered Works are to be thrown up.

Stope-hole, *See* Clieving-hole, or Stook and Kyle.

STOPE for STEMPLES.

A Hole or Step cut into the Side or any other firm Place, where there is occasion to set Stem-
ples; this is made in Proportion to the Egg-end
of the Stemple, which is placed in it, that it
may

may stand fixt and not loose its hold, or slip forth of it by any Weight whatsoever; the Head-end of the Stemple has a Stope made to drive it into, which is not round like the other, but long to receive the Head of the Stemple, the better to drive it in, and make it firm and fast, either to support Weight, or Climb up and down by.

STRING.

A Sample or leading of a Vein, or that often runs by one Side of a large or Master-Vein, which in Comparison thereto, is called a String; also, any Vein being divided by a Rider or Riders, in two smaller leadings, is said to fall or fly into Strings.

SUCKERS and HOOKS.

These any Body knows, that has seen a Rag-Pump.

SUMPS.

Are always the Places which are sunk and drawn under Ground, below the Shaft-Foot; they are of all Depths, according as Shafts are, yet with this Caution, not to Sink them so Deep, but that they may be readily drawn, so as fully to supply the Shaft with Draught; the second is so proportioned to supply the first and third Sump, to supply the second, and so on as occasion shall offer; there are few Veins but they do Hade more or less, and then the Sumps cannot go deep for they soon become heavy; but where Veins have great Covers there large, and deep Sumps are Sunk, and good and Roomy Sumps-heads are cut sometimes, so as two
Men

Men may draw thereat, where the Work shall so require; but in Scrins and Streat Veins, we scarce ever cut any Sump-heads at all, but clap in two Stemples, and lay the Turntree thereon, and fix it so thereon with two Stables, as conveniently to the purpose as may be, and have a short Shaft, or Sweap; and if the Drawer thereof have but room for his Shoulders, he will do well enough, altho' the Handlepeg is always turned Round before him within the Compass of his Body; these kind of Sumps can never be drawn double Turn, nor any great Depth, but if it is necessity Require, we cut and enlarge the Sump-head, to make the Place the better to draw in.

SWALLOW.

A loose and shaken place in a Vein, and sometimes without a Vein, however it takes its Name from taking Water, or letting Water Sink, otherwise it seems more properly to be a Shack; these Swallows are very Serviceable to those Mines that are troubled with Water, that is such Water as lies above a Level Water, for the Level Water is all the same, as well in Swallows and Shacks, as where there is none at all; these Swallows are for the most part inclosed by hardness, and they are very common to some Veins, as also other place.

SWAUGH.

A soft Clay, or mixt Gear of a considerable compass, yet not so large as those we call Lumbs, but enough to make an Alteration in a Vein for
some

some time, by throwing it up or down, or on one Side, or cutting it off for a while, so that it may be some time before the Vein recovers its Strength and proper Nature again.

SYMPTOMS.

This our Miners commonly call Senphis, and is some appearent Signs of a Vein, Pipe, Flot, or Shod, by Soil, Cauk, Spar, Tuft, Kevell, &c. and sometimes by the Colour of the Stones, as being Stained or Moldy in Colour; also that we call Deaf-Ore, Mouldings, and other decayed Stuff, which a experienced Miner is by his Observations acquainted with.

TAKER.

He that takes a Mear or Mears, from him that is the Founder; several Men may take one after another, if they think it may be worth their while, and then the Mears so taken go by some Name or other, as A's Taker Mear, or B's Taker Mear, or their second or third Taker Mears, to distinguish them from the Founders, and one Taker from another; these Takers if they do but keep their Ground in lawful Possession, and have them enter'd into the Barmafter's Book, with the Month and Day when taken, cannot be forced by any one to work their Ground, except they themselves shall think fit, 'till the Vein be brought forwards to his Ground, or as we Miners say, Chafed along from Stool to Stool, for in so doing, if he discover the Vein he makes himself a Founder, tho' he may free for both a new and old Vein, yet it can never be said to be

an old, or the Founders Vein, 'till such time as by Workmanship, they are struck together, and if that be not done according to Customary Limitation, it will be call'd new, and proceeded with accordingly.

TAPISH'D.

When a Miner are troubled in the Mines by Damps, and break them at unawares; yet to preserve themselves make some Shift to escape, or by some other Miners help, who is of a more Stronge Constitution, are preserved by being timely helped, and escape with Life; such a one we say, is Tapish'd, more or less.

THARF.

When a Vein or Pipe alters from its own intrenfical Nature to another, that is more Hask, Barren and Dry, and more bound up, and stiff impairing the Ore, yet the Vein keeping a reasonable Compass, and cannot be said to be Twitch'd.

THREE-TREES.

A kind of Timber used where we have one Side in Sinking, viz. a Head tree and two Forks; the Head-tree, much like to a Slider, but only it has Nogholes bored at both ends thereof; the Forks are plac'd in Stopes made in the hard Side, and Driven up against it past the Nogholes; the Nogs are put in and so holds the Forks for being prest inwards; the Forks are commonly set a little bearing, which is better than level, in Hading Places the Forks are, or ought to be set at right Angles with the Side.

THROSTLEBREST.

A kind of Ore or rather Knockings, mixt with a brown Tuft, and requires a great deal of pains in knocking it to make it Merchantable; but yet 'tis an old saying amongst the Miners, that half and half is Chapmans Ware.

TIMBER.

The several forts thereof is to be seen described in their proper Places.

TRAPDOOR.

A Door of Boards made to cover the Shaft, within the compass of the Shaft and Stoces, with two Stables driven into the upper Side of it, strong and well clenched on the under Side; then we have Holes bored through both of the Stoblades directly in a Line against the two Stables, and have a fit Rod of Iron, one end of it has a Head, that it cannot be drawn through the Hole, and the other end has a Noose made to put on a Hang-lock; this Rod we put in through the Stoblades and the two Stables, and the Lock at the end, and so make it safe; this is of very good use, either against Thieves, or prying Knaves, who may come at unseasonable times to see any Man's Work, and thereby take occasion to do him Damage; this is accounted a very great abuse, especially where there is any wrangles or doubtful Disputes risen, or like to arise on the Mine; but if in case one Man goes down into anothers Work, tho' there is no difference between them, he that does so, is to be

Fined

Fined by a severe penalty at the Great Barmote-Court.

Treffell, *See* Gablock.

TREES and LIDDS.

A slight way of Timbering used where such will only support some weight in some Place, for some little time; it is with one Head-tree, and that of the shortest sort, with a Fork set under it, often in the middle or near it; 'tis never used in any Drifts for service of continuance.

TRIALS VENTURES.

Places set on for the Discovery of Ore.

TRUNKS.

Pipes made to carry Wind down into the Works, some three, four, five, or six Inches Square, of half Inch Boards, well and exactly Plain'd and Joyned together with Nails, and to secure to carry Air, and Joynted one to the end of another, by having the ends so made, that the Trunk I now set always goes, or slips on to the end of the Trunk that I set before, these are held fast in their Places by Joggs, Stays, Cramps, or such like.

TUFT.

A soft Substance of divers Colours, that is very common in almost all Veins either more or less, sometimes 'tis a sure Sign of Ore, sometimes not, according as the Vein is agreeable with it in its Nature for Ore; but this is not easily to be Discovered, 'till by Work we see the Nature of the Vein, and whether the Ore delight, or is

always best in its Company, or otherwise; in hard Pipes the Ore seems to like of a black Tuft, and will bear very well in it, and easy to be cut, except in dead Places, and there it forms hard Hattrills, Hursh, and Pannells, mixt with Chirt, more or less, and is difficult enough in cutting.

TUG WITH.

A writthen Hassel Rod of a convenient length, fastened with the small end to the Spindle, then brought over the Turntree at one end of it, and made fast to the Spindle again, yet not so strait as to hinder the Turntree any thing at all in turning round in Drawing; this the Drawer takes hold of with his Hand, and puling it a little presses it down to the Turntree, and thereby lets down the empty Corse faster or slower as he thinks fit; and this is the way in Sinking of Shafts, or where they draw constantly Singleturn, this is to save their Hands, for if they let down the Corse by laying weight with them on the top of the Turntree as it runs round, it would soon take the Skin off; the same is also done with a piece of a Rope, but not so lasting,

TUMBLERS.

All sort of Stones that will not go into a Corse, without they be broken less, and which lie in Clay or some sort of Softness, and altho' in great Lumbs of Softness, these Tumblers are so big, that one may drive several Yards by the side of ore, and thereby seem as a hard and firm Side, yet they cut off and may be driven quite round,

about

about, and in such Places it is very Troublesome to make any straight Gates through them, as well as more Charge; now in such places Experienced Miners have always Judged it best to try in some convenient Place above the said Tumblers to find a Side, for it is very likely that a Side may lie at such a Level or perhaps higher still, yet it may prove to be at some considerable Distance; and for a Guide in such a Place, let the Miner warily Observe, first, whether at the Day there be any Appearances of a Rock, Shiver, or Rachill, and on what Side him it lies, and at what Distance; if not whether the Surface rise or fall within his proper Compass, if it rise it may be a harder Substance, but falling the contrary; if no Signs appear at the Day, let him observe secondly with his Work, if or not his Clay or Softness whatever it be, have any discernable Alterations in it, (which may very well happen in the height of a Gate) such as changing of Colour in one part or another of it, or if it continue all of the same, Observe the Clay, &c, whether some part be not courser, or finer, or more hard or soft than the rest; this observed, it is probable likewise that there may be discern'd some small parting between them that seperates them; and how the Dipp, or Rise, or hold Level, for it is agreed by all Miners that have had Experience of such Lumbs of Clay when mixt with such Tumblers, and such Signs appear that the very center is the lowest Place, and the rising of the Measures is a Guide

to the Side, * but if the Measures Dip after they have once risen, 'tis a Sign that the approaching Side is under cut by the Softness, and lies in the form of a Hanging Side; in all such Places it is always more kind, and softer near the Side.

Turn, *See* Sump.

TURN TREE.

These are known by any Body that have ever seen Draw-wells, and how they draw the Water up only at Mines, we have there Gudgions well and strongly made, and the Turntrees well Hooped with Iron Hoops at both Ends, to prevent it cleaving in driving in the Gudgions; the Turntrees are of all sorts of thickness, and the common length about thirty Inches; those we call Horse-turntrees, are the smallest sort and well and safely made, because they are chiefly to draw up Men; the Rope we call a Horse-rope, and it is for that use only.

TWITCH.

Where the Sides of the Vein come cloffer together than usual, making it very straight for some time, and in a manner Dead, or at least much worse than formerly; the length or depth of these Twitches cannot well be determin'd, without some Experience of the Nature of the
Vein,

* *Note*, If a Vein run upon one of these Lumbs of Clay, it is commonly thrown to one Side, that is the Lime-Sides, and proves often to the North-Side, and may be more surely depended on if it be the Hading-Side, and bear Ore likewise, which often happens.

Vein, they oftentimes alter in Sinking at some Wayboard or Bedjoynt, sometimes without either; in driving they may alter at some Slip-end or Cross-joint, or at the crossing of some other Vein; and this may be Observed, that if the Vein that keeps its course along, be naturally a hard Vein of itself, viz. A Vein that is not at all Subject to Soil, in which the Ore lies, (and many such there are and very good too) these Cross Veins will appear but like strait Endjoynts, tho' they are of themselves naturally Soft and Seetly, and that upon a very few Yards driving therein, these may prove very well, being Nipped up, or Twitched so at the very meeting; Twitches are Natural to all Veins whatsoever, therefore they are not much to be minded, or looked on, as to do any great Prejudice to a Work; yet some of them are something Chargeable, when they must of Necessity be cut through for some Conveniency or other, the better to carry on the Work.

TWYBITT.

Sometimes it is the same with Hack, but properly a Hack, made with both Hack-end alike.

TYE.

The Point where two Veins seem to cross each other, whether Right or Oblickly; but upon such Meeting each other, the one of them can be made no further out or along, but may be supposed for that Reason to Slide into, and go along with the other; this we call a Tye, because it Tyes and Unites it self with the other.

TYTH.

TYTH.

An Antient Custome or Duty, which the Miners gave to the Priests; in my Time I have known it taken every twentieth Dish, in some Places by the Tythman; in others every tenth, and where it was formerly but the twentieth, it is now taken every tenth; for all lying in great Mens Hands, such Gentlemen who could make Interest with their Head Stewards, have Rented it off them at a certain Rate per Annum; and these Men have been very hard and severe with the Miners, and taken to the utmost, or rather beyond it; this Tyth as some old Miners say, fell from the Clergy, according as the Abby land did, and together with it in *Henry VIII.* his time, so that those who had a Grant of the Lands, had the same of the Tyth Ore likewise, so far as it was known to extend or appertain to the said Lands, and still continues to this time.

Here is one very Remarkable thing concerning Tythmen who gather it, That they dare not presume to come upon the Hillock, or into the Coes, when the Ore is Measured, if the Miner shall think fit so to do, but must wait at a Distance 'till they are called to take their Due as it falls out, and then may be Commanded to withdraw 'till call'd again; what Reason our Ancestors had for this, we are not sure, it being so very Antiently used, but by all probable Conjectures, as some old Miners have thought, is this, viz. Our Ancesters the Antient Miners through a Religious Zeal they had for the Priests, under whose Ministrey they were Instructed,
thought

thought it a Duty incumbent upon them, to bestow this forth of their gets at the Mines, in a grateful return for their Petitions and Prayers which they daily made for their good* Success, and Preservation in the Bowels and Concaves of the Earth, and 'tis supposed that in these Times, this which is now called Duty or Tithe, might be much or little, according as the Miners gets was, or rather as he thought fit; but however it was, in time the Priests prevailed so far with the Miners, as to take it in kind what the Miner thought fit to allow, and this is said to be every twentieth Dish, and this the rather because we do never hear of any more, whatever it might be less; and the Parson sent a Man to gather it every Measure Day, but then they had the Prudence to hold him at a Distance, and not to stand by to see their Ore Measured, (without their leave) but called for him when perhaps such twentieth Dish came to Start, and take it away, and to stand back 'till he was call'd for again; by this it seems that the Miner preserved his Liberty therein, as a Means to let us know that this was nothing but only a free Gift, which they might continue or suspend as they themselves thought fit; but however by continuance of the Miners indulgence to their Clergy, time has brought it to a Custom, and Contentions and Law-Suits hath arisen between them, and this within my Memory; I have known the Parsons Sue the Miners in some Places for a Tithe-Ore at the Mines, and have recover'd it; this may be forty Years ago, and at that time, (as it is

W

still

still reported amongst the Miners) one *Parkin* in the *Low-Peak*, gave in upon Oath that the Ore grew, (not in the Sense as we mean, when we speak of the Generation of Mettles) but after the manner of other Vegetables, as we see Annually on the Surface of the Earth, and this he had Discovered by long Experience, to be a certain Truth; and this was sufficient Reason enough to make it Titheable, as indeed it now continues in some Places.

Upon this Ground some great Men, in whose Hands this Tithe has seemed to be lodged, have Demanded the like in some other Places, the Miners have agreed to try it by Law, but at last some of these for some Interest under such Men, have forsaken their Fellows, and would not wage Law as the rest, so has caused the Business to be wholly left off, and ended in a SubmissivePetition, wherein they have acknowledged themselves to be their Vassals, and to be dealt with as they should think fit; so that now they pay in many Places every tenth Dish, while in some others where they stood the Law, the Miners threw them out of all, and pay none to this Day; and on the other side, some rather than contend, have agreed to pay every twentieth Dish, which they now do, and this we remain very easy in, as Judging it to be reasonable, and according to our old Custom.

VEIN.

A certain Space in the Earth, that hath length, breadth and depth, bounded with Sides
of

of some Kind, whether they be hard or soft, in which Space is contained the Mettle, or Ore of what sort soever, together with its Soil that naturally attends it, be it more or less; this Space is called by some the Chest of the Vein, and by reason of the difference of Veins, they are distinguished into several sorts thus:

Hard	}	Veins.	Caukey	}	Veins.
Soft			Kevelly		
Quick	}	Veins.	Leppey	}	Veins.
Dead			Old and		
Sparry			New		

The Names of these several sorts of Veins do well enough explain themselves, only we will make some general Remarks thereon.

First, That no Man can know the Nature of a Vein, as to its Sides, Soil, and the Ore itself, and what other concomitants that may attend it, to vary or alter the property of it, for the better or worse, 'till by workmanship made therein; he sees the Nature of it.

Secondly, That most Veins (except they be very small ones) be they Quick or Dead, appear in some part as they Range along to the Day, or within a very little thereof, so as some Symptoms may plainly be seen, or in such Places with a very little Pains; and in quick Veins often times is very Rich, as if it was the top Branch, and very Flower of the whole Growth.

Thirdly, 'Tis observable, that the poorest sort of Miners who use to Prop pritty much, and make Cast-holes, (being not able to venture

much further) are generally the Discoverers of them, in such sort of ebb Places, and also in Stone Quarries, or by Plowing, Ditching, and such like; hence a Miner may conclude that there may probably be a good Vein in this or that Place, but the most Skillful in Mining, may miss his Aim in going the nearest way to it.

All Veins are bounded by some sort of Sides, as I observed before, some by Lime, some by Chirts, others by Greet-Stone; some a North Side of Greet, and the South Side of black Shale; sometimes one Side will be Lime, and the other Clay, somewhat mixt with Tumblers; others will have a hard but joynty sort of Stone, that it seems to be an exact Mixture of Chert and Stone, well blended together, (if one may suppose the Mixture was once Liquid) some are bounded by Shale tho' not often.

Lastly, 'Tis very rare to see a Vein to set perpendicularly down, but Hadeing to the one Side or the other to the deepest Soles, and as seldome to find them Hade first one way and then another, except it be a little thrown awry by some Bulch or Excreffence growing out of the Side, which does often impair the Vein but continues not long; and sometimes a large Way-board or Joynt may alter it a little, otherwise a Hadeing Vein alters not its course of Hade; yet this End may Hade more than that End, that is ten or twelve Mears off; as for what we call Vein Soil, 'tis such as the Ore lies in, and is Tinctur'd according to the Nature and Species
of

of the Vein, and Vein room includes the room in the Vein, that is between the Sides, unless under Shoulder wideness.

Verdict in Courts, *See* Barmotte-Court.

VIRGULA DIVINATORIA.

This is the thing so much talk'd of amongst Miners and others, and if their be such Virtue in a Hassel-rod, it must be of excellent Use for the Discovery of Mines, some I know Speak with great Confidence of it, asserting its Power, others Laugh at it, as vain and foolish; for my Part, I never saw one that would work the Effect that some Boast so of; tho' I have been at the Pains to cut some, and that according to their critical Planetary times, and in several Years on Midsummer Eve, and have duly Observed their necessary Rules, but as yet never could discern the least Motion of it, so that as to this part of the Work I rest Satisfied. But then there is an Obstruction in the Case, although the * Rod may be duly gathered according to Rule, and it is this, that the Rod will not wagg or work in every ones Hand, but those who are rightly Dignified by some secret Influence at the time of their Births, or at the Time they are using the Rod, which seems to me as intricate as it is idle

Now if any Miner should be so curious as to desire to know the Astrological times, which they

* I have been inform'd, the Dignified Author of this Invention was a *German*, and that at the last he was deservedly hang'd for the Cheat.

they say is proper to be Observed in gathering the Rod, I will here give you the Rules as I have been Directed, viz.

For cutting the Rod, * let it be on *Saturn's* Day and Hour, let him be Anguler and Strong, well aspected of *Jupiter* or *Venus*, and if they be Strong it is the better; let the *Moon* apply to him by good Aspect and Strong, or at least to a Planet of the same Triplicity, or with a fixt Star of the same Nature, and still better, if some Regard be had to part of Fortune.

For the proper time to use it, take these Rules.

1. *Saturn* is Significator of Lead-Ore, place him in the 4th Strong in his Dignities, the *Moon* applying to him by good Aspect, and *Jupiter* or *Venus* with him in the 4th if it may be, or *Mercury* may do, if well aspected by *Jupiter* or *Venus*.

2. Let *Jupiter*, *Venus*, *Sol*, *Mercury*, or the *Moon*, be in the Ascendent, tenth or fourth, or at least behold the said Angles; if that cannot be let, the said Angles be free from the Infortunes or their Aspects, or from a Retrograde, or Cumbust Planet, or that is in his fall, or detriment or weak.

3. Put *Jupiter* in the second, or *Parsfortuna*, or some other fortunate Planet, or let *Jupiter* or *Parsfortuna* be in *Conjunction*, *Sextile* or *Trine*,
to

* Some do not regard this, only to cut it in the right Planetary Hour, and with Devotion the Charge to it, and lay it upon Wheat or Barley, and keep it for Use; this they have the Vanity to call the *Mosaical* Rod.

to the Lord of the Ascendent or 2d. and the better if any Reception happen, but beware it be not by *Square* or *Opposition*, for that spoils all. These are Instructions enough, for those that will go this way to Work, and are able to make any thing of them.

But now that the Industrious and honest Miners, (whose Business seems to be Diametrically opposite to those gazeing Sydropheles) may have a Plane and Rational Discourse of the *Divining Rod*, which I esteem far beyond these Rules just now deliver'd, I will tell him what that great searcher of Nature, the Hon. Mr. BOYLE, says concerning it, in his second Essay of *Unsuccessful Experiments*, it is as follows:

‘ I dare not omitt to say something to you of the
 ‘ Virgula Divina, or rather Divinatoria, by
 ‘ which many Mineralists pretend to Discover
 ‘ the latent Veins of Metals; some use a forked
 ‘ Hazel, whose Horns they hold by the Ends in
 ‘ each Hand; and others content themselves to
 ‘ chuse a Hazel-Rod, (which some will have to
 ‘ be all of the same Years Shoot) and this they
 ‘ bind on to another streight Stick of any other
 ‘ Wood, and walking softly with it over those
 ‘ Places, where they suspect the Bowels of the
 ‘ Earth to be enriched with Metal:; they say
 ‘ that if they pass over a Metalline Vein, the
 ‘ Wand will by bowing towards it, discover it;
 ‘ and some Dealers in Metals I know, who as-
 ‘ firm that by holding the Metals successively in
 ‘ that

' that Hand wherein a Man holds the Rod, he
 ' may discover what determinate Metal is Pre-
 ' dominant in the Vein, for when he puts into his
 ' Hand that Metal wherewith the Mine chiefly
 ' abounds, the Wand will manifestly bow more
 ' strongly than when 'tis held in the Hand with
 ' any other Metal; what to determine concern-
 ' ing the truth of this perplexing Experiment, I
 ' confess I know not; for Agricola, himself, af-
 ' ter a long Debate concerning it, gives us this
 ' account of his Sense, *Metallicus igitur, (says*
 ' *he) Quia eum virum bonum & gravem esse*
 ' *Volumus, Virgula incantata non utetur, quia*
 ' *rerum natura peritum & prudentem, furcatam*
 ' *sibi ufui non esse, sed, ut super dixi habet*
 ' *Naturalia venarum signa quæ Observat.* The
 ' diligent Kircherus informs us in his *Arte Mag-*
 ' *nettica*, that having exactly Try'd the Experi-
 ' ment with Metals: for he mentions not his hav-
 ' ing Try'd it with Mines, he could not find it
 ' in any Measure succeed; and we ourselves hav-
 ' ing several times made Tryals of it, in the pre-
 ' sence of the confidentest Asserters of the Truth
 ' of it, could not satisfie ourselves that the Wand
 ' did really stand either to the Metals when
 ' placed under it, or to the Metalline Veins,
 ' when we carried it over Mines whence Metal-
 ' line-Ore was at that very time Digging out.
 ' But on the other Side, diverse good Author:,
 ' and even our diligent Countryman, Gabriel Plat,
 ' does ascribe very much to this detecting Wand,
 ' and diverse Persons in other things very far
 ' from Creaulous, have as Eye-witnesses with
 ' great

' great asseverations asserted the truth of the
 ' Experiment before us; and one Gentleman who
 ' Lives near the Lead-Mines in Somersetshire,
 ' leading me over those Parts of the Mines
 ' where we knew that Metalline Veins did run,
 ' made me take Notice of the Stooping of Wand,
 ' when he past over a Vein of Ore, and protested
 ' that the Motion of his Hand did not at all con-
 ' tribute to the inclination of the Rod, but that
 ' sometimes when he held it very fast, it would
 ' bend so strongly as to break in his Hand; and
 ' to convince me that he believed himself, he did
 ' upon the promises made him by his Stooping
 ' Wand, put himself to great Charge of Digging
 ' in untried Places for Mines; (but with what
 ' success he has not yet inform'd me) amongst
 ' the Miners themselves I found some made
 ' use of this Wand, and others Laughed at
 ' it; and this I must take Notice of, as peculiar
 ' to this Experiment, that the most knowing Pa-
 ' trons of it confess, that in some Mens Hands
 ' it will not at all succeed, some hidden Property in
 ' him that Uses the Wand being able as they say,
 ' to overpower and hinder its inclinatory Virtue.
 To which I must add, what a very famous Chy-
 mist who affirms himself to have try'd many o-
 ther things with it, besides those that are com-
 monly known, very solemnly Professed to me
 upon his own Knowledge, namely, ' That in
 ' the Hands of those very Persons, in whose
 ' Hands the Rod will (as they speak) Work; there
 ' are certain unlucky Hours governed by such
 ' Planets and Constelations, (which I confess I
 X believed

' believed not enough to remember their Names)
 ' during which it will not Work, even in those
 ' Hands wherein at other times it manifestly
 ' will; but of this Experiment, I must content
 ' myself to say, what I am wont to do when my
 ' Opinion is ask'd of those things which I dare
 ' not peremptorily reject, and yet am not confi-
 ' dent of, namely, That they that have seen them
 ' can much more reasonably believe them, than
 ' they that have not.

By this it appears that Mr. *Boyl* upon Trial,
 could not satisfy himself as to the truth of the
 Experiment, tho' he had exactly try'd it several
 times, &c. and *Glauber*, a Man of great Indust-
 ry and Search into the Nature of Mettals, does
 say in short, that to use the Rod, is altogether
 fallacious and uncertain, but thinks the seven
 Metals melted together into a Mass as big as a
 Walnut, and a hole perforated through it, and the
 Rod implanted therein might do the Business, but
 he does not say that he ever try'd it; but then
 again he would have it done under a proper Con-
 stellation; and afterwards in one of his other
 Works he says, that the Discovery of Veins of
 Metal in the Earth, is as a Man happens by
 chance to light of them, so that from all that is
 here said in behalf of the Rod, it remains very
 uncertain.

But now lest the honest Miner should think
 there may be something hidden in the *Latin*
Quotation set down by Mr. *Boyl* from *Agricola*,
 I have here set it down in English, as done by
H. P. thus:

‘ A Miner therefore because we wou’d that
 ‘ he should be an honest and grave Person, let
 ‘ him not use the Inchaned Rod ; and we
 ‘ wou’d that he should be a Person Skilful and
 ‘ Prudent in the Nature of things, and so the
 ‘ Forked Rod will be of no use to him, but as I
 ‘ said above, he has the natural Signs of Veins,
 ‘ which he Observes.’ By this it appears plain
 that *Agricola* thought an honest and serious Miner,
 might from his long Experience in Mining,
 be depended on with more certainty than the
 Detecting Rod for the Discovery of Veins ; and
 I dare say, that several Men, as *Carless*, *Sheldon*,
Keeling, &c. any one of them has made
 more Discoveries by Proping in their times, of
 both Quick and Dead Veins, than all the Men
 in *Great Britain*, put all together, that boast so
 much of the Divining Rod.

It would be a very valuable thing, if by a
 Hazel Rod one could Discover the Veins of Metal
 in the Earth, since Hazels are very common
 in most Countries, and would be preferred much
 before the industrious ways of Proping, Casting,
 and the hazerdous and expensive way of Sinking
 at all Adventures, and this Rod realy would
 furnish the Miners with what they have complained
 for want of, to wit, that it may be suspected
 that there is a rich Vein in this or that Place,
 or not far from it, if one knew but the nearest
 way to it ; this is all the Difficulty, and till I
 see it proved, I shall give no credit at all to it.

Since I began to write this very Page, I have tried the Rod once again upon *Halkin Mountain*, as well in Places where a Vein may be supposed to be, as on and over Veins at this time getting Ore; and also over large heaps of Ore at the Day, yet never could discern the least Intelligence from it to confess, or acknowledge that it knew any thing of the matter.

I have formerly been in Company with one *Jonathan Smith*, who lived in the *Low-Peak* in *Derbysire*, near *Worksworth*, an Antient Man and a Miner, and he was the most Famous of any in my Time for an Instrument he had, where-with he pretended to Discover Mines; it was a Rod of either Iron or Steel that he carried in his Hand, and to the upper End was fastned a strong Silk String about a Yard long, and at the End of it was a small Bag or Purse, with something therein, but what it was none knew but himself, for this was the chief Secret; he affirmed and (others say) confirmed the Use of his Rod before many Witnesses; and that sometimes it would have given such sufficient Notice of the Ore, that it would not only have bowed, but sometimes given so sudden a Twitch, that it would almost have turn'd him round by the Force thereof; I was once accidently in *Worksworth*, at a Relations House, and enquiring about him of what Success he had with his Rod, they told me he was often using it, and but two or three Days ago his Rod was at the Smiths Shop to be Peiced, it being then broken in two very lately as he was carrying it in a certain Place

Place for the Discovery of a Vein ; the Truth is, it was much talked of thereabouts, as a very useful thing by many ; and others I heard that were Miners jested upon it, and ridiculed it much, and the Man likewise ; and this I must observe, that no one with whom I Discoursed about it, could affirm that there were this or that particular Mine, that owed its Discovery to his Waggers, (for by that Name they then called them) some Miners told me that by his Waggers he could find out a Vein, but could not tell whether it were Quick or Dead ; but be it how it will, the Man had the boldness to publish an Advertisement in the publick News Papers, where I have read it, to give Notice to all Gentlemen and others, who had a mind to imploy him, for the Discovery of Lead-Mines in their Lands or else-where, might receive full Satisfaction by his Skill and Experience therein ; accordingly he has been sent for into the *North* Parts, but upon enquiry of some Miners that I have been acquainted with, that have come from those Places, they can very well Remember him there with his Instrument, and discribes the same and his way of using it, but never knew any Discovery that was made, but much Money spent upon that Occasion ; one thing further I must Remark, that this old Man had one only Son, and afflorid, civil, hopeful youngman, yet by all the Trials, Means, and Times that the Father could Use, the Rod would never Work in his Hand, for which reason the Father said, it was some hidden Quality in the Person, that
 assisted

affisted the Rod in working, which his Son was wholely destitute of.

From all which Arguments on the one Side, and on the other, it seems a little difficult and uncertain to conclude about it, and the rather because we are not able to pry into its hidden Qualification; however for my own part, I am inclined much to the Negative, 'till by a clear and plain Experiment I shall be better informed.

WAYBOARD.

It is in all respects like to a Bed-joynt, only this Difference, that it is more certain to be depended on, and is much wider, that is a greater height of Wayboard-Gear between the Top Stone and the Bottom Stone of the Wayboard, or between the Roof and the Sole of it: they are always larger than any that are esteemed to be Bed-joynts, and of various thickness, and may be accounted from one Foot to three, four, five, or six Foot thick, or more, according as the Wayboard is found to be; they are always bounded by Rock above and below, 'tis fill'd with Clay either softer or stiffer, mixt sometimes with pieces of Stones; sometimes they are more rank and soiley in Colour, and their way or course is horizontal running, through whole Liberties, dipping and rising with the Stone, and keeping its proper Roof and Sole Stone, as may be seen by Thickness, Colours, Kinds, &c. all Pipes break at them, and Veins leap at them; they are the Occasion of very remarkable Alterations, they oftentimes afford Water more or less, and

sometimes

sometimes will be Hoverind and Shaken, and yeild Wind; these Wayboards are of very good use for Driving in for Doors, Cross-cuts, &c. between one Vein and another, where the Veins lie not too far Distance off one from another. Or for Discovery.

Watchpin, *See* Idlepeg:

W A R G E A R E.

A general Name for all manner of Tools, Timber, Ropes, Corves, Buddles, Flatts, and whatsoever belongs to the Mine, as necessary for the carrying on of the Work, including them all.

W A S T E.

That which is seperated by the Water from the Buddled-Ore, by Buddling the Boofe, Smitham, &c. and thrown aside on Heaps; or it is that which is thrown out of the Sive by the Washer in washing; this Waste is always wrought or washed over again, yeilding good Profit, and so a second time, a third, and sometimes it is worth doing over again a fourth time.

Here is one Remark upon Waste-Ore, as I am informed by an Acquaintance of mine, an Experienced Man in Refining the Silver from the Lead, as having been his Business for many Years, and still is at this time; he tells me that this Waste-Ore yeilds the most Silver of any Ore that one and the same Vein produces, that is more than which we Miners call, and esteem to be the best, for it is our Bing or Round-Ore, that we do think so to be, and our Merchants

will

will give the most Price for it, and indeed one would think that the Heart or middle Part, might be better than Outsides and Husks, which is what we suppose the Waste contains. As if while Ore is Concocting and coming to Perfection in Veins in the Earth, the finest and most purest Parts thereof, should move to the Outsides, (as Oiley Substances do in some Bodys) and the more courser Parts incline towards the Center.

WATER in ORE.

It is a thing pritty common in breaking Lumps of Ore, to find in them Loughs filled with Water, although the Work itself be Dry enough; this Water is thought to be of some Medicinal Virtue, and if a Miner would prepare some small Cup, and keep it ready by him, expecting and using a little Dilligence when he cleaves such Ore, he might easily get some of it; I have caught of it in my Hand several times, 'tis very clear and cool, and tastes very well as most of our Ground Springs do, what Secret Virtue I know not, except the rarity of it.

WATER ISICLES.

These are found in Shacks, Hollows, and Cavities of the Earth, and are bred from Drops of Water, falling from the Roofs in the Hollows or by gently trickling down the Sides, many of them hang by one end; others adhere to the Sides, the hanging sort are like those Frose at the Eves of Houses in the Winter time, only they are not so transparent; they are produced

by

by Water that receives some petrifying Quality as it passes through the Rocks; they are hard and bricle, and some I have seen very large; I once found one in a small Hollow in the Shape of a small Hat, it rested loose upon a Clay as a Hat upon a Table; the Place was dry then from any Drops, so one may suppose it fell there but at some certain wet Seasons; we do not know that they are any Sign of a Vein, or of Ore in any Vein where they are found.

MINERAL WAY.

In Customary Liberties, it is the way that the Miner has laid for him out next to the Highway, and nearest to his Mine for his carrying off his Ore, leading Water to his Mine, Timber or what he might have occasion for, and none may hinder him, the manner is thus: He calls the Barmafter, and orders him to Summons two of the Twenty-four, which is sufficient, and the Barmafter coming to the Place in the Side of the Highway. makes a Breach in the Fence, and the two help him, they pass over, and here the Miner hangs up a Gate, and keeps it locked for his own Use: then the two Twenty-four Men take Hands and walk with them Stretched out Side by Side, the Barmafter leading them the way as Straight as conveniently he can to the Mine, and this stands Good for a way to the Work, now if it happen that the Vein runs paralel with the Highway at a Distance, then we follow our Vein, tho' it cross several Fields, and cannot have another laid out at present, 'till some great
Y Necessity

Necessity require it, nor can any other Man make use of the Miners way for his Convenience, but the Owner of the Land may Sue him for a Trespafs.

Way-Gates, *See* Drifts.

WEB of PICKS, &c.

The length of Picks, Hacks, Mandrills, &c. from the Eye to the Point thereof, Short and Strong are the best for hard Work, and coming into the Shins; too long are not good at all, but some Hacks for a certain Use before mention'd, and if made too Straight are worst of all.

WEDGES.

These are made of Iron of several Sizes and Steel'd, and there are three Kinds, first a Stook or Clieving Wedge, this is 6 or 7 Inches long, to drive into a Stook-hole between two Iron Leaves, to Rive and break off the Stone, and is of very good Use; the second Kind is for Stone that has some Joynts in it, or for Ore, these are Strong and well made; the third is a Nut-Wedge, 'tis very little, Short and Strong, this is for Spar, Tufft, or some sort of Stone that has Dry Joynts in it, and softish withall.

WHARR.

A very ready and useful way of late invented, for carrying Corves or Kibles, especially in Stright and roomey Ways, by which a Labourer will do the Work more ease, and twice as much as formerly without it, the way is thus: There is a Stemple set fast up in a convenient Place

Place as we fhall fit, and at a Distance as 20, 25, or 30 Yards, according as we think proper; there is another fixed, these are not set in the middle of the Gate, but nearer to one Side, but yet keeping such a Distance from the Side, that the Corfe or Kible may pass along without touching it; between these Stemples is a Rope tied, and Stretched hard out, at a due Distance from the Sole of the Drift, as you may perceive anon; upon the Rope is to be set a small Pulley-Wheel of Wood set in a Case of Iron to turn upon a Pin, the Edge of the Wheel is made Hollow all round, and must run on the Top or upper-side of the Rope, from one end of it to the other; the Case of Iron must be made Oblong, and the Sides Broad and Strong, and to close the Wheel exactly, yet not to hinder its Motion; at the lower end of the Case which comes down somewhat below the Rope is placed a Hook, whereon to hang the Corfe or Kible, and being hung thereon, its weight lieth upon the Pulley running on the Rope; and now if the way be clear it needs no more but a push forwards with your Hand, and it runs along the Rope at Pleasure; Labourers use to Grease the Rope and Pulley, which makes it run much better; and for their better conveniency to hang on the Corfe or Kible, the Labourer makes a Lobb of a just height on which they set the full Corfe or Kible, and putting it off with a small Shove it the more easily sets forwards; there is the like made at the other end of the Rope, for the more

ease to take it off the Hook, so that the Labourers are not troubled with any Weight at all in the Carriage as formerly, which is of very good Use both for ease and more haste, especially at such Places where they have Engine Shafts and much Draught, and the Gates are cut large on purpose.

WHERK.

A small and unlooked for turning in the Stone, Side, or Ore, often attended by a small Joynt of Cauk, or Sparr running therein, being softer than Ordinary.

WHOLES.

Such Ground as was never yet cut or stired by any Man, but lies in its own Nature intire and whole, it is easily discern'd by its closeness and firmness, (except in some sort of loose and shaken Places) nor will any Oldman by length of time become like to Wholes, but still will be more open loose and irregular; when on the other Hand Wholes though in a soft Work, is according to its (for there are fundry Kinds) Nature, is more compact with a kind of freshness in it, that the Difference is plain enough to a Miner of ordinary Experience; the Difference between crushed Wholes and Oldman in an old Work, may be known but this requires some Observation and Experience more then the other.

WIND-PIPES.

There are three Kinds which are used to convey Air into the Works, when we want Air into them, and when we want Air we say it is windless

windleſs, and the want of Wind in the Works is a very great impediment and common, it is unwholeſome to the Miner, and a great Slavery to abide it; the old Miners ſay, that the worſt Season in all the Year, is when Peaſe are in Bloſſome, and it is certain when the Air is Hot, and the Weather Sultery, the Air does not take the Ground ſo well as in Winter time; want of Air cauſes the Candles to burn dimly, which when they begin to be ſo, in a ſmall time will begin to be worſe and worſe, 'till at length it will not ſuffer them to burn at all, though 3 or 4 be ſet together, and a Man make it his Buſineſs to attend them; this Work for the Miner is very Hot and much like a Stove; the Air is thick and muddy, making him Pant and Blow, and Sweat, with a Pain and Beating in his Head and Stomach; and when he comes to the Day into the freſh Air, he is troubled with a Giddineſs in his Head, and ſometimes with Vomiting; I could wiſh that ſome of the Croſs Carping Maintainers might try the Difference of theſe two Airs, that they might know what the Miner abides to earn his Wages in ſuch Places.

Theſe Windleſs Works being left over Night, grew clear by the next Morning; but before you come at it, you ſhall feel the Air to be tainted with a very ſharp and keen Smell, having ſomewhat the Smell of an Onion, but more Nauſcious and Unſavory, but being in it a while 'tis loſt, and the Day is ſpent as before; this bad Air if the coldneſs of the Earth once con-

denſe

or draw it together, it will lie like a white Mist on the Sole of the Gate in a small compass, and in a Night time become Poisonous and deadly to any Man, that once breaks or disturbs it, and this we call a Ground Damp; to prevent this Disaster, we use Wind-Pipes or Trunks of Wood, being half Inch Boards, formerly the Square wiihin had used to be 5 or 6 Inches, and if well made was very good for carrying Air, but of late Years they make them but about 3 or 4 Inches Square, which are too little, large Trunk with a Horse-Head, are pretty well for some time; when these fail we betake ourselves to Tin, or Lead Pipes and Bellows, this way the Air is always muddy and bad, yet the Miner may make a Shift to abide it, and if the Pipes be well joynted, they will carry Wind a great Way.

There is another contrivance for to bring down Wind, and is very good for deep Shafts, as Engine Pits or others, but chiefly where there is good Room, and 'tis thus: Sink a small Wind-hole such a Depth as you shall think may be sufficient, little or much, and at such a Distance likewise, 6 or 7 Yards from your Windless Shaft, and on that Side where you Observe the Wind to blow most frequently, which is most commonly from the West, then drive a small Gate between them, and let your little Wind-hole be raised high and plain about the Top as may be, that nothing may hinder the Passage of the Air on any Side about it; then on the Shaft
in

in the middle thereof place a piece of Wood across, with a Hole bored about the center of the Shaft; in this Hole must be put a strong and large Iron Pin near half a Yard long, in the middle whereof must be a Knot to hinder it for going any further down into the Hole; and for the Wind-Box it is made thus: First Frame a Square of Sawn Timber like a good Joyce, as wide as your Shaft at least, if wider the better, and let it be well Joynted together, at each of the four Corners let Slots be made, to set up on end four more of the same Joyces, about five Foot high, and on the Sides to make it more Stronge, and on the Top of these is put another Square like the first, and all made fast together; however across the under Square must be a piece of Timber well fixt, with a Hole in it, and so Framed that you may set it upon the Iron Pin before mentioned, this with a few Iron Ferrils will make it move easily at Pleasure as you see the Wind turn from any Quarter; but the Sides must be made close and square by nailing Boards thereto, in order to Force the Wind to your designed Place, otherwise your Box you may turn upon the Pin to what Point you think fit.

Another way by Sucking, this may be done by Bellows, which I forgot to mention before, and it is thought by some to be the best way, and 'tis no more than inverting the course of the Bellows, and 'tis done.

Yet here is one other way if once put in Practice, may be more safely depended on, and it amounts

amounts to a safe Demonstration, (and what I said before I presume is no less) it is thus: Let there be a Prism of Wood, let the Square be what bigness you please, the Length about six Feet, let the Bottom be close shut up with proportionable Plank, and a Hole must be cut therein to receive a short Piece of Trunk suitable to the purpose; this must be well Joyned and a Valve placed on the Top of it, and to the lower end of this, may Trunks be applyed, &c. to Work in the hollow Prism must be a Pestel made of a suitable Plank, but something less than the square of the Prism, for this must Work in it, and in the middle a Hole must be cut and a Valve; now because the Pestel is near an Inch lesser than the Prism it Works in, upon the Pestel must be placed even with the Top of it, half Inch Boards well drest, Joyned and Nailed on one to another, and to reach downwards 12 or 15 Inches; these still fill not the Square, but suppose it wants not much this want should be made up, by Nailing on this moving Square something that is Soft, as Hare Skins, &c. it would move easy enough, and loose little Air in working, which should be in a Frame as Bellows or like them.

The same may be done in any Wind-Shaft, if Boards be well Joyned and Nailed to the square Timber, and managed as before said; but a proportion must be Framed between the Prism and the Trunks, for a great Quantity of bad Air may be exhausted at each Stroak, as may be seen
by

by a Calculation ; so that something of the Nature of the Cock may be easily contrived to let Air into the Prism, if the Windpipes are too little.

Yockings, *vide* Square-Timber.

WHETHER there be any Practical Miners that have written any thing of Mineing, is more than I yet know, but several Gentlemen have furnished us with Bits and Scrips taken on Information, mixt and wrought up with (perhaps) some Guesswork of their own ; but I do not see that a Man is either the wiser or better for them, for what I have delivered, is the very Practice as the Experienced Miner well knows ; and altho' some Miners may find fault with it, as a thing of no Value, and say they can do the same, or much better themselves, when at the same time they are not able at all to penetrate into some Parts of Mineing which I have delivered ; but be it how it will, I shall not mind them, since I have already the Approbation of some of the most noted and esteemed Miners, by these and such as these only, (viz. Men whose Knowledge is built upon the Foundation of a Practical Experience, and I hope other Mineral Countys may afford such) that I expect a just Censure let it fall as it will. If any shall object against my Rough, yet Plain way of Writing, &c. he may easily excuse me, when I tell him, I always was, am, and hope by God's help so to continue the remainder of my Days, A MINER. For other Slips, you must Pardon an old Man's Memory.



The following Discourse is Incribed to that
Honest and well Experienced MINER
John Staley, of Toulgrave, in Derbyshire.

I T is you to whom I presume to Dedicate the following Discourse, because I know that your continual Practice and Experience in Mineing, has enabled you to be a competent Judge of the following Discourse, and of the whole Work also; and you are able to have added more Light to the Whole, had not the Effects of Age prevented you in some sort; and since you have been the only Person that has of late Years stood up to Defend your Autient Mineral Customs and Priviledges, acquired and settled many Ages ago, by the Care and Pains of your Worthy Ancesters, that their Posterity might enjoy the Benefit thereof, and though they were just expiring at that Time, you happily slept in and was the Reviver, and supported your dying Liberties and Customs.

I hope one or other may arise that may be encouraged by your Example, that may be a Miners Friend, who may make up the Defects that they shall find in this Treatise, and some Discoverys of their own; I know that Miners are accounted at this Day by many who reap great Benefit from their Endeavours, to be a Set of dispiseable Men of no good Characters, but Tools to be employea on Occasions in the Mines, and a great deal more they brand them with; but let such Men know, there is good and bad in all Societies

cieties and will be : But no more of this ; but
hope this Treatise may convince the World, that
there is some Skill as well as Slavery in Mine-
ing, which Truth you can assert, as well as your
old Friend,

WILLIAM HOOSON.



A N

A P P E N D I X,

Concerning

*The three Propositions in the Title
Page.*

W H E R E A S in the *Title* of this *Trea-*
tise, I undertake to shew how a Gen-
tleman may know whether he has *Lead Mines*
in his Land or not, is thought by some Persons
already to be extreamly difficult, if not impos-
sible to be done ; but for the better Satisfaction
of such, I have here added this following Dis-
course, that hereby I may the better explaine,
and clear that difficulty in some reasonable Mea-
sure ; for although it is already done in the
Treatise aforegoing, yet it lies scattered here
and there in small Parcels, under such proper
Terms as necessarily required some part of the
whole for their better Explanation. And in the
first place, here I desire my Reader to stop a
little

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little, while I lay him down this useful Remark following, viz. That I do not at all pretend to see into the Bowels and Concaves of the Earth, any more than a Physician can see into the Body of Man; but it is proper and apparent Signs and Symptoms at the Day, that indicates to us Miners the Nature of Places, whether they may contain Metalline Veins or not; and this has been the way practised by the Antient and wisest Miners, who doubtless has been the most knowing and Skilful in that part of Mineing, having acquired it by long Practice and Experience.

§. 1. Countries that lies Low and Flat, seldom afford any Lead Mines, and if the do, they are always Subject to Water, and 'tis hard to find out any convenient way to get shut of it; this makes them Chargable in Working, so that they are of little or no Value. A Country lying somewhat high and Mountainous, and those Mountains made up of Rocks, such as lie Regular, or at least something like it, are the most natural Places for the producing of Mines; which being considered we observe first, what Rocks, and of what kind they are that appear to the Day, their Colour after what manner they lie, whether Dipping, Rising or Level. But if it so happen that no Rocks appear whereby you can satisfy your self, see if there be any Dingles or falls of Ground or Water Courses, let them be well searched throughout, if any thing that is Significant and Remarkable may be found; in
this

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this Case the bare hard Stone is not enough to venture on, without some Vein-bearing Symptoms appear to give you encouragement; then take Notice of what Kind they are, their Colour, and in what manner their natural Situation is in the Wholes, or before they are fired; then by taking a Point of it according as it shall seem most likely to run; (but if it seems to form both Sides or one, be they whole or broken, is more safe) and also to Note the Dip, or Rising that it shall now seem to take. And now if it carry any Smutts or Pees of Ore more or less, in your Leading 'tis likely it may increase by further Work; and it is a fair and hopeful Venture at some Distance from the Place, to Sink upon the Rising thereof. Note, They must be great and good Reasons that must encourage us to Sink or try upon the Dip of any Vein, or Beds, be they of what Kind soever, where the Surface of the Ground lies low, I mean not much above the common Sources of Water Courses and Rivers; but upon rising Ground or Mountainous, and amongst Hills, it is otherwise. If none of the Signs abovesaid is to be found for your Encouragement, consider well the Make of the Place, and others that are contiguous and adjacent, see how they resemble one another in their Natures, by comparing them together, and if you find them to be nothing promising but altogether Steril, you may easily conclude there is no Lead Mines in such Places, except they have a thick and strong

Cover

Cover and lie very deep, and if so not at all fit for a Trial to make a Discovery of a Vein; but if a good Vein point into a Piece of Land, it is prudence to wait a while 'till the Forfield is brought as near as may be.

§. 2. The Reason why we would make a Discovery of the Rock, is this, because Veins are most Naturally bred there, and more especially in the Lime, and sometimes in the Chrit-Rocks, not altogether excluding all others, but not so common, and seldome in Clay, or perhaps never without one Side, made up of Tumblers of some kind with Clay, at or not far from the Vein it self, so that it will seem to form the present Limmits of its compass.

Any Signs of a Vein appearing in any Revel-et or Water Course, shew themselves to be more hard than those found on dry Land, and if there be any Grains of Ore, they are Coated be the Colour what it will. I have often where but small Water runs, (in such Places as I have thought proper) cleansed the Bottom very well, making a Place that the Water might Pool a little if Rains fell, after which I have found small Grains of Ore in the Pool amongst the Sand that was washed into it, but always Coated, so as not to be discerned, 'till I had crushed them between two smooth Stones, and then the Ore appeared; these Pools may be made still higher up for Discovery, even 'till you can find none at all of the aforesaid Grains; thus by shifting the Pools we may come something near
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to the Flot, or shod from whence it may be washed out, if any small Pees of Ore be found, search well on the Sides of the Water Bank, and whether the Dip or Rise following the same; and having a Regard to the Strata or Beds if any such, or if any such may be easy reached, always following the most likely Symptoms, and so you may be guided the better to make a Discovery in some other Place before you.

§. 3. In many high and Mountainous Places, there are those Places to be found that we call Shack-pitts, Shack-holes, or Swallows, letting the Water Sink down in any wet Seasons; these in some Places are good Signs of a Vein, either under them, or not far from them; but we dare not say upon viewing one of these Places, upon which Side of it a Vein may run, except we know something of their Nature by some adjacent Places where there has been Work made, and thereby the Miner knows better by his Trial and Experience, and can better Judge.

In any Ground if it be that the Lime Rocks appear to the Day (I do not mean loose Lumps and Tumblers) such as are something firme, and seem to be regular, tho' they may appear broken, cloven, and rent by Places, yet some of those Rents may be worth Searching into, to see what may set in the Wholes. If a small ridge of Rock be seen to run along above Ground, so that one Side of them appears, or if both, if they be of a considerable length, the Surface on the one Side or the other, will be more lower running

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runing along as the Rocks go, or if the Surface be plain and some settleings in some Place that is Remarkable be found therein; these and all the before mentioned are Signs of some Break, Chun, or Vein, and some Gentlemen considering these things, have made Discoverys in their own Land, without any other help than that of a common Labourer and their own Directions.

§. 4. There are sometimes ways by which Veins are accidentally Discovered, as by a Tread of a Horse Foot in Sliping on the Ore has laid it bare, and many times in Stone Quarries, or by Dicing, and in Highways after the fall of much Rain in Places that are Gravelly and will Tread up, and be washed away by the Stream runing down, many times is left or washed bare; some Signs or Symptoms of a Vein as small Pees of Ore, Sparrs, Soil, or some such like Signs, which will in all likelyhood lead to some Vein; moreover it is common to hear People tell of finding Ore in Mole-hills, or by Plowing, which is probable enough; but then we as often hear that the Husbandman has taken no Notice of it, as not willing his Ground should be spoiled by Mines; others have reported it for a Truth, that the Plow has run over it for a considerable length, but they have been so mistaken they never could find the Place again; I my self has been with the very same Persons searching for this told of Ore, but could never Discover it; I do not doubt but it may be some Act of Providence

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vidence, and that very justly that it shall be hidden and concealed from him, when he is so Petulant and Sawcey to reject a Blessing which he sees with his Eyes; may take with his Hands and apply to his Advantage one way or other; although he have but Tenant-Right to the Land itself.

Veins are Discovered by their Shods, and Shods by Molehills, or by some Water trickling down some small Descent, and washing some small Pees bare, or taking them along in the small Gravel or Sand, in which Cases we always suppose some Vein, &c. to lie on the ascending Side; otherways for the Discovery of Veins, see in the Term Proping in the Treatise beforegoing where they are fully discribed; for the finding of Veins of Mettle by the Divining Rod, I have mentioned it before in due Course, by Reason it is so much talked of by some credulous Persons, as well as Miners, who has repented their Folly after their Expences when it has been too late; Mines have been found out by Corn as it has been growing, the same by Grass which is discribed in the Word Proping beforegoing; there are some Miners who say that a Vein may be Discovered, and has been (which seems like enough to be so) by the Grass on a Frosty Morning, but then for this Business must be chosen a Calm and Sunshiny Morning, and a white hore Frost that is moderate, and where a Vein lies near to the Day, the Surface of the Ground will appear of a Due, or much less to be Frose, or
b covered

cover'd by the horey Due, by this I have heard of Mines being found out; these are all the Practical ways that I know of, that Miners are acquainted with, and this by their own Expedience, and may be relied upon.

§. 5. I do not know what can further be added for Instruction about Mines, nothing but Practice and Experience, and that may inform you further about it; you have here lay'd down such general Rules, as are to be observed for the Discovery of Mines, in any Mineral Country whatsoever, and particular Rules to discern the natural Properties of any Vein, Pipe, &c. after it is once discovered, for Veins differ very much, (as I have before noted) and this difference it only know by their Symptoms that attend them, and this falls under the Miners Observations only.

Some Gentlemen have thought (such as have been Adventurers at Mines) that it might be of Use to the Miner, to Observe the Specifick Gravity of Ores, Soiles, Sparrs, &c. thereby to acquaint us the better with their Natures and Properties, and so we might perhaps be assisted by making and Observing such Experiments to learn much of the Nature of the Vein, &c. as to its Changes and Alterations; I cannot much Fault this, but I never set myself about trying it, for it is too nice and fine a Scrutany for a Miner to trouble his Head with, but form our Judgment from what we see with our Eyes, or handle with our Hands; but any Observing Miner

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Miner knows, that in many Works there is a Difference in the Ores, Soils, Spars, &c. according to their natural Situation in the Vein, as they lie to the Sides, either North or South, and sometimes it is otherwise, whereby he can very often foresee an Alteration coming on.

I am very far from thinking that Mineing is at its Perfection, tho' it is as much increased in the Number of Miners and Venturers, which is owing only to the goodness of the Lead-Trade before the present War, yet we do not know of any thing material or useful, that has been found out for the better or more easier to the Discovery of Lead-Ore, than what has been left to us by our Forefathers, but rather much impaired by Neglect and Idleness, many thinking themselves able Miners enough, that never saw a Proping-Spade in their Life, nor ever knew the Use of it, but enough of this; and I will spake a few Words to the honest and inquisitive Miners, for they are the only Men that are able to search into, and (I hope) improve to their Advantage what follows:

§. 6. I take it for granted, that such Miners to whom I now write, are by their Experience something acquainted with the Nature of their Work, and that they are able by the various Alteration to foresee by them, the Increase or Decrease of the Ore, and other Accidents that may happen in the Vein, and this from apparent Signs, and it has been thought by some able Miners that Ore it self contains more certain

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Signs than any of the Soils, &c. that attend it, and if so, the Ore must alter in Weight, Colour, and Grain, as Lighter in the first, Pale and Faint in the second, the Grain Small and Weak in the last; and because the Grain in Ore is more talked of than understood, I would offer to the Consideration of the Practical Miner, these few Queries following:

Q. 1. Whether this Grain is more plain in Ore that stands Ribways, or that which lies in Pieces or Lumps?

Q. 2. Whether this Grain according to the natural Situation of the Ore in the Vein, may be found to varie or not?

Q. 3. Whether the Grain of the Ore may not lie upon a plain allowing Dipps and Risings according as the Nature of the Place is, or whether Gravity has any Force upon it to precipitate it, or whether it may Ascend, as we see in Vegetables?

Q. 4. Whether by the Grain we may not be led to its Center, (richest Place) or the Place where it may derive its Original from?

Q. 5. Whether a Vein by the Interposition of Twitches, &c. may not truly be said to have many of those Vegetative Places or Centers?

Q. 6. And lastly, Whether when Ore goes forth as in Dead Places, and Twitches, there does not appear some sort of Symptoms in the Grain very Ominous, to judge of its good or ill Success in the time approaching? These

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These I leave as Queries, and they seem to be in the dark, since Miners have taken no Pains as yet about the Resolutions of them, I thought fit to mention them, because they may help to instruct us in the very greatest and most weighty Part of Mineing; and thus I think I have cleared most of the Difficulties in the first Proposition, and think also that a Man by what I have written, may become a Miner that has not known much of it before, if he will but add Practice and Experience. But after all that I have said, both here and elsewhere in this Treatise, concerning Signs for the Discovery of Veins, Pipes, &c. I wholly exclude the Divineing-Rod to give any Assistance to the Miner, and although I have mentioned it in due course, it being so much talked off by some Miners, yet I freely confess I could never gain any Ineilligence from it, nor do I think any of its Patrons able to give any convincing Reasons for its working such a strange Effect.

PROPOSITION II.

§. 1. The Second is, if I suppose there to be a Vein, and consequently Lead Ore may be Discovered, how he may know the cheapest and best way to come at it? When there appears due encouragement for Trial, no advice can be better than to follow the most hopeful Symptoms, but above all, Ore be it more or less, is the only and principal Guide that any Miner can follow, let its Course or way of running be either

ther Flat, Hadeing, Dipping, or Perpendicular, and if it so happen that loose Lumps, or small Pees lies scattered in Soile or Softness, then 'tis very likely that an Alteration may be, if you can but recover a Side; I have known in much Softness, where it has been sunk down many Yards in bits of Ore, and yet missed the Body of it, that has lain to the Side at some Distance, and been quite out of Compass in Sinking, 'till by some Plainer Tokens, or Hadeing nearer it has been Discovered; if you discern any Difference in the Ore, 'tis good to pursue that which is the most Hearty, Florid, and Promising, and more especially if it form itself into any Order in its lieing, taking Notice of what Soile is most agreeable to its Nature, that is the proper Soile that lies, and it is bred in; and also such as you perceive impairs it, whereby you may be the better enabled to take the most likely way for the Recovery of more; by so doing may be learned better the Nature of the Vein, so that you may be able to foresee when an Alteration is at hand, and whether it be for the better or worse; it is also good to take Notice of any Cross or Slip-joynts you meet with, or any Way-board; any of these may alter the Property of any Vein, to make it more hopeful, or the contrary, even as they agree or disagree with it in Nature: Hard Spar Veins have the least Impression made in them by such Crosses, &c. and very seldome cut through the Spar, except it be very thin or soft, and loose of it self.

These

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These short Directions may be Sufficient in making Trial for the Discovery of a Vein if well minded; but yet here is one thing I would caution all Adventurers about, to take care who they imploy in their Work, for there are many loose drunken Fellows, that have been the Occasion of some Gentlemen spending their Money to no Purpose, Cheating both their Masters and the Country, and runing away; the bad Signes for Ore, are first of all to imploy such Men, and here I will tell you of one of these sort of Fellows, who a Gentleman employed to make some Trial for him in his Land, a place was fixed on where to try, and the Gentleman Sunk Twenty Yards or more, being very hopeful all the way, paying his Miner generously and freely; at last the Man found some Ore, and shut it up, being Resolved to conceal it from his Master, and worked triffling to no purpose, discouraging his Master every Day, and at last left him and went his way; but after some time he returns to his Master, and his Master being not willing to imploy him any more, nor venture further at the Work, the Man offered to take it of him and try himself, at so much per Ton; after some Reluctance he agreed with him: He falls to Work, and in three Days time bares the Ore he had before Discovered and shut up; but before he had got one Corf full of it, he was kill'd dead by a Stone, and the fraud fully detected; this was a very Remarkable Example of Providence, and worthy to be taken Notice of by all Men. The

Second

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Second is, when the Work is blocked up with Stone and some Joynts, yet holds long so without any notable altering thereof. Lastly, when the Soile is mixt with Gravel more than Soile, and in the Gravel lies small Chirts, black and smooth on the out Side, not contiguous but scattered amongst the Gravel, the like of a white Substance, hard and like to Caulk in colour, these are not at all Natural for Ore, but are bred in barren Places, and are very bad Signs, and no good attends them.

PROPOSITION III.

§. I. Now we come to the third Proposition, which is the way or Method of carrying it on to the best Advantage, in order to make a Profitable Work; this depends much upon the Judgement of that Person who is the chiefe Manager, and Director of the Work, and many times it happens that this Steward or Director of a Work, is but a small Miner, having never cut one Yard of Ground in his Life; such a one would do well in adviseing with his Workmen, and hear what they have to say, for an honest Man will never give any bad Councel to his Steward, either to make his own Ends of him, or to the Prejudice of the Work.

When once a Work is Discovered, in a short time there will grow some inconveniences, as want of Air, or may be Troubled with Water, or the Draught not so ready for Landing the Gear so fast as you would have it, and that this
may

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may be done there ought to be good Gates, as Shafts, Driffts, and Sumps; for Wind or Air, if you take good Way-Gates, you may contrive to take it as far as you please; this I know will seem Strange to some Miners, but with care and such contrivance as may be used with some foresight in cutting the Ground, will make it to appear otherwise; see in the Treatise before, under the Word Windless, where are several ways described, and may be further improved for that Purpose.

§. 2. Air when it is wanting is a great hindrance to the going on of a Work, insomuch that it being Observed by a Gentleman, and a Member of a worthy Company of Adventurers at the Mines, thought that the want of Air might be much helped, since Air is generated by Motion, and that if the Miner run a Wheelbarrow briskly backwards and forwards along his Way-Gate, he might find a great deal of Benefit by it, in Assisting him with a Supply of fresh Air as occasion might Require; or otherwise that Air might be taken down into the Work from the Day in Bladders, and let out in such proper Places as require it; and in all probability this might assist a Man at his Work very well.

These are ways perfectly unknown to Miners, nor I suppose not so much as thought at; but if we consider of the Nature of bad Air, viz. such as we find in the Works, we shall conclude it to be the same as if the same space was filled with

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Nafty, Dirty, Muddy Water, in relation to its being made more clear, and fit for use by some means or other; but whether plunging into and stirring up a hole of Sludgy, Muddy Water, be not the way to make it worse and more Muddy, may be easily determined; taking fresh Air down in Bladders would do the Business well enough, provided you could take down a Quantity big enough, that is, so much as will nearly fill the same Space that is taken up by the bad Wind, and might last for some time, until it was vitiated and mar'd, and then the Remedy would be to get more, which would be very Troublesome; this Fault in the Works is not to be cured, but by a Current or Spring of cool and fresh Air, having one way into the Work and another out, that it may clear the Place or Places that wants it; I have seen a small open crack in the Side afford some Air, tho' very little, but fresh and good, assist us beyond Expectation in a Windless Place, after such crack has been Discovered, which plainly shews that a small feeding of fresh Air is a very valuable thing in a Place where it is wanting.

Now a Days it is Experimentally known that a Gallon of fresh Air will not serve a Man to Subsist and Breathe in above a Minute, and then less than a Hogshead will scarce serve him an Hour, but it is mar'd and made unfit for him to breathe in, and even Poisonous to him; and yet here is nothing assigned for the Man to do, but only sit

still

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still and breath in it ; but in the Mines we can do nothing without Candle-light, and again by Experience, we find that the Flame of one Candle will spoil as much Air as a Man may use ; so that we will suppose one Man and one Labourer, to go down into the Work in a Morning when the Work is clear and fresh, they cannot do without each of them a Candle, and then it will follow that a Hogshead of Air will serve them but about fifteen Minutes, or one Quarter of an Hour ; and yet here is no Allowance made for a Man's hard Breathing, Working, and Sweating, which are always certain to be so in such a Place ; but we will pass those Things by, although they must help to impair the Air very much, but this is not to be fixed to any certainty as the Former ; these things being all considered, their remains nothing to do but to use some endeavours for a fresh Gale of Air to pass through the whole Work, and then Business may be done with Pleasure and Satisfaction, both to the Workmen and Masters.

§. 3. There are many good and profitable Works that have their Profits much lessened by Extravagant Expences, and unnecessary Charges ; this is through the Inadvertancy or want of Skill in the chief Manager, on whom the whole Business depends ; therefore when a Work is troubled by Water, proper Places are to be chosen out where to Sink and make Lumbs to receive it, and large enough to hold it, that it run no

further into the Work for a Shift or two, or so long as shall be thought fitting and agreeable to the Circumstances of the Work, so that we need not be hindered by drawing it up while we are to do other Work, but rather before or after the Stem or Shift is over; this is the way where the Water is but small, and may be managed in common Shafts by ordinary Buckets; but where the Springs are more large and not to be Mastered by this way of Drawing, there must be used the large Engine-Shafts, with all the Furniture thereunto belonging, which is not my proper Business to meddle with in this Place, because they extend beyond our common way of Venturing, where we have no other Encouragement as yet, but purely for Trial, and to make a Discovery of a Vein if we can, or at least to make what Trial we can in a Work though it gets some Profit, to see if it may be worth the while for us to be at any greater Expences.

Where Works prove very well, there good Way-Gates are to be taken, I mean such Sets of them at convenient Levels, which are likely to be of the most use for taking out such Parts of the Vein as you purpose to be done; but in other Places where the Ore may be taken forth it is not so necessary, for if the Miner can make a good Shift to take it out, and secure himself from Danger, will be mostly what can be required of him; and if as he cuts his Ground, he have any Dangerous Places, he will contrive to
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secure them from falling, by Coating them up with his Deads and Rubage, by making secure Bundings, or otherwise, as in his Judgment he shall see fit: yet after all if it be not done with some Care and Foresight, it may prove at length a prejudice to the Work; for it is most sure, that all Mines so much buried by the Workmen, (which when they are suffered and allowed to do) becomes their speedy Ruin; when on the contrary if room but remain, it may prove of use as sometimes it may fall out, or when the Work decays, there will be the more room perhaps to make more Search, or if one Man be tired of the Place, another will be more ready to come to try his Fortune, for a Work that is kept empty is no Expence to the Masters; when it is much filled up they are often for some Reason or other, at the Charges to open it again.

§. 4. In carrying on a Work, it is not often seen, the Vein sets perpendicularly down in any Place, but more commonly on the Hade more or less, and the Hade being the lesser, the Shafts, Turns, or Sumps, may be Sunk the deeper, and the better they may be drawn, but some Hade so much, and are so crooked, that it is hard to make the Corse to follow down after a Man; in this Case Stempls are set in such Places as conveniently they may, and Boards Nailed thereto, to help and Guide down the Corse, with all the care that can be; in such a Case a Plim-Shaft would be the only Cure, but then it may
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be said that, that would be very Chargeable, as being all in the Hanging Side, which perhaps may be all in the Lime, Chert, or some other sort of Rocks that may seem to be hard to Sink in; I own that all this may be so, and there is no great Reason to think it according to the present Appearance to be otherwise; however let it be considered, what Depth your Shaft will be when it will fall down to the Place you design it, when it comes into your Vein, then take a careful View of your Hanging Side, in Order to Observe some End Joynt, or any Shake, or Craks, that are likely to make some Impression into the Side and Roof; such as those may let down a Shaft with more ease then perhaps you can expect; but before a Shaft is pitched upon, care must be taken to have the Ground Dialled, that the place on the under-side may be slit where you design your Shaft to fall through; and if any Water come down in the aforesaid Joynts, 'tis a good Sign that it may be got down with less Expence! And this Remark further you may Observe, being confirmed by Experience, the Hanging Side never proves so Solid and hard to Sink in, as the Hadeing, but it is more Subject to Joynts, and Cracks, both of those we call End Joynts, and Flat, then the Hading is; and if a Shaft be so Directed, or by mistake in Dialing, as to fall upon the Hading Side, and still have a Number of Yards to Sink, before it will come to be
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deep enough for the Design it was first intended; such Shafts when they came to be cut down in the Hading Side, by Reason of their Hardness, are seldome or never Finished for to Answer the Purpose intended; I have known many that has had this same Failing, and the further such a Shaft is Sunk down, the Harder and Faster it is, and more distant from the Vein, and in the End becomes tiresome to the Masters, and so they leave it off; and there is no way left but to drive out to their Vein, and then they must content themselves with having a Sump, or Sumps, to make the way as convenient as they can for their Purpose. This is a great Fault, and is not easy to be remedied by any small expence, and especially in Engine Shafts, where Water is designed to be drawn for clearing the Soles of a Work; this great Fault, may be attributed to the chief Director or Steward, for want of due Consideration of the Hade of the Vein, before he begins such Shafts; what may further belong to the carrying on a Work, may be refered to the Steward and Miners Judgment, according as they see the Nature of the Work varies, which is very often in Mineing, but more especially where Works are Soft, and much Room is cut and Emptied in a short Space.

§. 5. There is sometimes a sort of Work happens, which has put some Miners to a Stand, as not being acquainted with the Way how to do it, and it is such as this following, viz. It often falls

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falls out when Work is made into Veins, Pipes, &c. by Sinking or Driving, that the Miner Discovers an Underfet, or under Level, or some Break or Run, going a Side from the Vein, Pipe, &c. or some back String, the Ore leading him from the one to the other, and at last he is hindered either for want of Air, or a long and round-about Way, that makes the Work more Chargable; then he has no Remedy but cut from some other Gate a Door, or Croscut, for his further Conveniency, and these prove oftentimes hard, and are therefore thought long and tedious in doing; therefore to Dial such a Place from the Day, may be a great deal of Trouble oftentimes, but yet it may be made much less, and done as exact and secure after this manner, viz. First make a mark on the under Side in some proper Place, as you shall think to be most fit for for your purpose; from this mark Dial, and apply your Line thereto, and so on to your Forfield on the one Side, come back to the said mark again, and Dial to the other Side, making on each of the Sides some mark or other, and so your Work is done; when you come up again you may lay it out, and Stake it under any Wall or Hedge, where you please, and you will see what Ground you have yet to cut between your two Forefields, and whether they be straight one upon another, and if not you will see the Difference, and so may direct your way to the best Advantage; but if

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it be far, or the Forefields are not straight one upon another, take the true Point where you have laid it out at the Day, between your two Forefields, and that same Point will direct you on the under-side how you shall Drive; a Skilful Dialer know the way of this, and will many times as he proceeds, contrive for his own Conveniency as he may, though not according to the common Practice; the way of Borrowing a Cross Length is very Useful in laying out Ground at the Day, to avoid Trees, Bushes, Buddle-Holes, and even a River, if Occasion be to Dial a cross it, so that a Man of indifferent capacity may in most Difficulty help himself; and in a hard Hadeing Shaft a Line needs not to be used. but a Rule is as well, and more Expeditious by a great deal.

§. 6. For the better carrying on of a Work, something may be said of the Proprietors chief Masters or Agents, who have a great Rule and Sway in any Work whatsoever, as to the Management or carrying of it on, for all knows that they will be Obeyed, be their Directions never so far out of the Way, and that Miner is in Danger of incurring their Displeasure, if he presses any good Reasons to the Contrary; however I shall venture for once to mention some of the many causes that are hinderances, in the due manner of carrying on a Mine to the best Advantage and Profit.

It is at this time a way that of late Years has been brought in, and now is so much Practised by Masters and Maintainers of Mines, which is

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so hard with the poor Miners in setting them Bargans, whether it be by Tons or Yards, (for in many Places a Master will not give a Miner a Days Wages for a Days Work) the Miners must take what they are pleased to give them, and some are so unworthy as not to give what they promise and agree for, and all to bring in some present Profit, but to who, we shall not determine; but this never can bring any Advantage to the Work, and the Reason is, or may be, that when Men are so hard tied up by small Prices, &c. that Care is not so present with a Man in his Business, as when he gets by his hard Labour a comfortable Subsistence for himself and Family; and what may be the ill Consequences of such Management to a Work, let them judge who are the Men chiefly concerned.

Another Hinderance in the carrying on a Mine is in the Masters or Maintainers, and it is an old Remark, and as true as old, that there are two sorts or kinds of bad Masters: The first is he that pays to the Miners his Money before hand, being thought thereby, to make them Careless, Neglegent and Idle, by so doing; the Second are those sort of Masters or Maintainers, as Pays the Miner very little for his Work, or none at all; this must be an Obstruction to any Work in the Management of it, and the Miners that are thus Engaged, must be in a wavering Condition, and very thoughtful what the End may be, which makes the Work go on but Slowly, and Men are thinking they are working for Nothing. I will tell you an In-

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stance of a couple of Fellows who came as Adventurers, Men well known to you, that came into *Wales*, and appeared very Substantial and Creditable, to all but those that knew them, their stay was not long in *Flintshire*, as being too well known to form any Design there, but Rode into *Cardiganshire*, where they hoped for less Acquaintance or rather none at all; there they applied themselves to a Gentleman who had some kind of Mines in his Lands, he Entertains them very well, they drew up Articles of Agreement with him to venture in his Land, and set an Attorney to Work to comprise them in a Lease, and put them into due Forme against the time they were to come thither again; these Mines were not of any Value for any thing they had got, yet had got some Ore but much troubled with Water; this did not at all Discourage those two Adventureous Gentlemen, but they gave Orders for Iron and Steel, and a Smith to make Tools, soon got Men and set them to Work, which was to drive up a Level to lay all Dry, and have it soon done besides; this Level was begun in the Rock, and was likely to continue till it crossed the Vein, and the Estimate given of it was thought it would cost upwards of a Thousand Pounds; they stayed to set the Work to go forwards with all Expedition, talked great and bold things, but in the mean time they must leave the Country for a while, and fetch a Supply of Money to carry on the Work, took their leaves of their Workmen with all the encouraging Words that might be, but

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none saw a Penny of their Money, away they went; and it appeared afterwards that these two Fellows had formed a Scheme for selling their Undertaking at a great Price, and thought they had had some Gentlemen ready that they might impose their Cheat upon, but they failed in their Design, and never came more at their Work, either to Seal their Lease or pay their Workmen, in so much that having wrought as long as any Body would trust them any thing, they were forced to Steal away in the best manner they could for their own safety; these two Pretenders, my Friend, (as I said before) were well known to you, and you would wonder to hear them Named, but I will not Steal my Paper with the Names of such vile Fellows.

Another Hinderance in the due and right Management of a Mine, is an Indolent Person to be the chief Master or Owner of it, and there is no cure for it unless the Steward be an Honest Man, and otherwise, both the Workmen and Master will be abused, the Workmen cannot escape; such a Steward if he be a greedy covetous Person, has a Gap open on both Sides him to Oppress and Tyranize as he pleases; this gives great Discouragement to the Miner, and what good carrying on of the Work may be in such a Case, I leave it for others to Judge of and Determine.

Another Hinderance in carrying Work regularly on, is when the Partners cannot agree one with another, and all consent in their Opinions to take the most reasonable and best way for
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their own Profit; but Quarreling one with another, and will put in Men in Proportion to their Parts, whether they be Miners or not, hence it comes to pass that many false Stories are told amongst Partners by such Men, to please their Masters Humours, and 'tis hard to have a right Understanding amongst them; this is a great Evil to a Work, and it has been Observed that such Works do not long Prosper, so that there is nothing like Unity amongst Partners, if they expect any good to attend them; there are some of the many causes that hinder Works that they go not regularly on, one honest Man with full Power prevents all these Mis-carriages, and fully Answers the End on every Account that may justly be expected from him.

§. 7. And I would offer a Word or two of Advice to those that are Maintainers of Mines, but not to those that are joyned together, and forme Companies on purpose for Adventuring for Lead Ore, &c. for to such an Honest Steward is enough; but here I speak to such Gentlemen who, if three or four Joyn together, have a mind to try their Fortune in Venturing; to pick out an Honest Miner or two that Substantial, and of good Credit, take them to be Sharers in the Work, taking such Parts as they can well bear, that they may Venture and Pay their Proportion of all Charges; such Men will be sure for their own Advantage to pursue the Work with all Expedition and Dilligence, without Incombering you with any Extravagant Charges, and will be able at all times to give
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Account of the Condition and State of the Work, and their Reasons for what they do, or what they Design to do; and moreover they will not neglect the Work, but have sufficient Work done by all they imploy for their Money; this I take to be the best and safest way for Country Gentlemen who have a mind to Venture their Money; this I do the rather advise, because there are some Maintainers after they have spent some Money, and the Work answers not in their expected time, then they think that they have not fair Dealing from the Workmen that they Imploy, or that they are misled by them on purpose to make them spend their Money, which Jealousies might be prevented, by taking in such a Partner or Partners, and all Suspicious Thoughts blotted out; and this I think would be a Piece of good Management, let the Work prove to Answer our Expectations or not.

§. 8. Now as I do apprehend, I have said as much as this Matter requires to Explain what I proposed to do in the beginning hereof, and that it is not extreamly Difficult, as is commonly thought, so that if any Gentleman that by the Marks I have laid down, shall think he has Lead-Ore in his Land, the Expence to try a little would not be much, by getting the help of some Honest Miner to make Search in such Places as seem to be the most likely, 'tis not known what might be Discovered; but above all, I would have all Gentlemen who are inclined to Venture to try for Mines, to have a
Care

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Care of some Men, that I think may be called confident Miners, who are too bold in asserting the Event of Works in General, and also in such or such a Place in particular; with these are the like Affeverations as, *It cannot miss, It will prove so or so, I am sure of it*; with many such like Expressions, to draw a Man on to spend his Money, which without some other Testimonies concurring and falling in to strengthen his Assertion, and those not to be concealed from a Master neither; otherwise, 'tis but all Conceite, Sham, or Design, which is but a weak Ground-Work for any Gentleman to be persuaded to spend his Money on.

So great Boldness was a thing unheard of in former Days, the old and most knowing Miners never used such extravagant Discourse, and yet they saw as far into the Nature of Mines, as most do now a Days, and could do their Work as Effectually as the Men of these times; plain Indications thereof are frequently seen in their old Works, so that the present Miners are at a stand to account for their way of Working in diverse Places, and we find by Experience in all old Works, (except hindred by Water) he has taken the Ore clean enough: Now my Friend, what Improvements has been made in Mining within this fifty Years, are mostly such as belong to Exhausting or Drawing up, whether it be Gear of all sorts, or Water, and convenient enough, but no Discoveries to assist the Miner under Ground, but that safe and sure way of Blasting. One thing more I should not forget
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to tell you, that the *Axiom* Established amongst the old Miners, may now be placed amongst Vulgar Errors, viz. *Nothing is Heavie in its proper Place*; the Discoveries made of late Days, has clearly proved it to be a Mistake, and the Truth is, that all Elements Gravitate, or are of Weight in the same Element; and this Observation falls more under a Miners Business than any other Mens that I know of, and a Miner may make good Use of it.

And now my Friend, and all other my Fellow Miners, I leave what I have written to your own Judgments, speak of it as you shall think fit, I do not expect to please all, and it is easier to find Fault than amend a thing; however if some more knowing Miner of Experience, Sense and Integrity, would take the Pains to correct my Faults where he finds I am wrong, and also assist in supplying what he shall know by his own Experience is wanting (for there is room enough in the Mines for any observing Man to make Discoveries of many things, which to Miners are yet unknown) so the whole might be more perfect, would be great Satisfaction to the Author. And that all Honest Miners and Maintainers of Mines, may go on and prosper, is the hearty desires and wishes of their Fellow Miner,



W. H.

F I N I S.